PEH

A2-A6 Process Controller

Service manual

0740 801 006 **000201**

Valid for machine no 724 XXX-XXXX
Valid for program version PEH 1.00A, PEH1.1, PEH1.2, PEH 2.0

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READ THIS FIRST

GENERAL

This service manual is intended for use by technicians with electrical/electronic training, for help in connection with fault-tracing and/or repair.

The component description refers to the component names in the connection diagram.

This manual contains details of all design changes that have been made up to and including February 2000.

This manual is valid for program version PEH1.00A, PEH1.1, PEH 1.2 and PEH2.0

The displays vary depending on what program version is being used. Therefore there are two chapters about SYSTEM CONFIGURATION.

SOFTWARE VERSIONS

From production start 97.07.04

PEH program (Flash, IC 15)	486471880 PEH 1.00 A
DCDUO program (Prom, IC304)	68S07001A02 CHKSUM 0210 Dat. 19970704

From 97.12.12

PEH program (Flash, IC 15)	486478880 PEH 1.1
DCDUO program (Prom, IC304)	68S07001A02 CHKSUM 0211 Dat. 19971212

Miscellaneous improvements acc. to error list (error 1 through 43).
VEC 8000RPM motor (A6G) can be used (error 4 and 11).
MEK 4 motor with tacho can be used (error 7). Product code for “A2TFF1 (Weldtrac) added.
Calibration menu deleted (error 9).

From 98.04.04

PEH program (Flash, IC 15)	486478880 PEH 1.1
DCDUO program (Prom, IC304)	68S07001A02 CHKSUM 0221 Dat. 980404

DCDUO software 68S07001A02, CHKSUM 0221 compatible with hardware 971029 and all later versions. Upgraded DCDUO program preventing unsafe usage of tacho function (error 36).

From 98.05.20

PEH program (Flash, IC 15)	486478880 PEH 1.2
DCDUO program (Prom, IC304)	68S07001A02 CHKSUM 0221 Dat. 980404

Upgraded PEH program according to error list. External start/stop function (see point 46 in error list).
Strip welding.
Stainless steel setting (error 39). If this function is needed the power source board 486367001A in the LAF must be used. ESW welding added (new function added).

From 98.09.30

PEH program (Flash, IC 15)	486478880 PEH 2.0
DCDUO program (Prom, IC304)	68S07001A02 CHKSUM 0221 Dat.980404

(LAF 2.0 program version is needed together with PEH 2.0 if all new features are needed)
Miscellaneous improvements acc to error list
Inch conversion (error 48,49, 52, 59)
New manual programmable start method added (error 61)

SAFETY

Users of ESAB automatic welding machines have ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions.
The following recommendations should be observed in addition to the standard regulations that apply to the work place.
All work must be carried out according to the specified instructions by personnel who are thoroughly familiar with the operation of the welding machine.
Incorrect or unintentional operation of the equipment may lead to a hazardous situation which can result in injury to the operator and damage to the equipment.

1. Anyone who uses the automatic welding machine must be familiar with:
   - its operation
   - the location of emergency stops
   - its function
   - relevant safety precautions
2. The operator must ensure that:
   - no unauthorized person is stationed within the working area of the machine when it is started up.
   - that no-one is in a hazardous position when the carriage or slide mechanisms are operated.
3. The work place must:
   - be clear of mechanical components, tools, or other obstructions that could prevent the operator from moving freely within the working area.
   - be organized so that there is free access to the emergency stop.
4. Personal safety equipment
   - Always wear recommended personal safety equipment, such as safety glasses, flame-proof clothing, safety gloves.
   - Do not wear loose-fitting items, such as scarves, bracelets, etc., which could become trapped.
5. General precautions
   Live electrical components are normally shielded from accidental contact.
   - Make sure the return cable is connected securely.
   - Work on high voltage components may **only be carried out by a qualified electrician.**
   - Appropriate fire extinguishing equipment must be clearly marked and close at hand.
   - Lubrication and maintenance must not be carried out on the equipment during its operation.

WARNING

ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK - Can kill
- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

FUMES AND GASES - Can be dangerous to health
- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to keep fumes and gases from your breathing zone and the general area.

ARC RAYS - Can injure eyes and burn skin.
- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

FIRE HAZARD
- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

NOISE - Excessive noise can damage hearing
- Protect your ears. Use ear defenders or other hearing protection.
- Warn bystanders of the risk.

MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

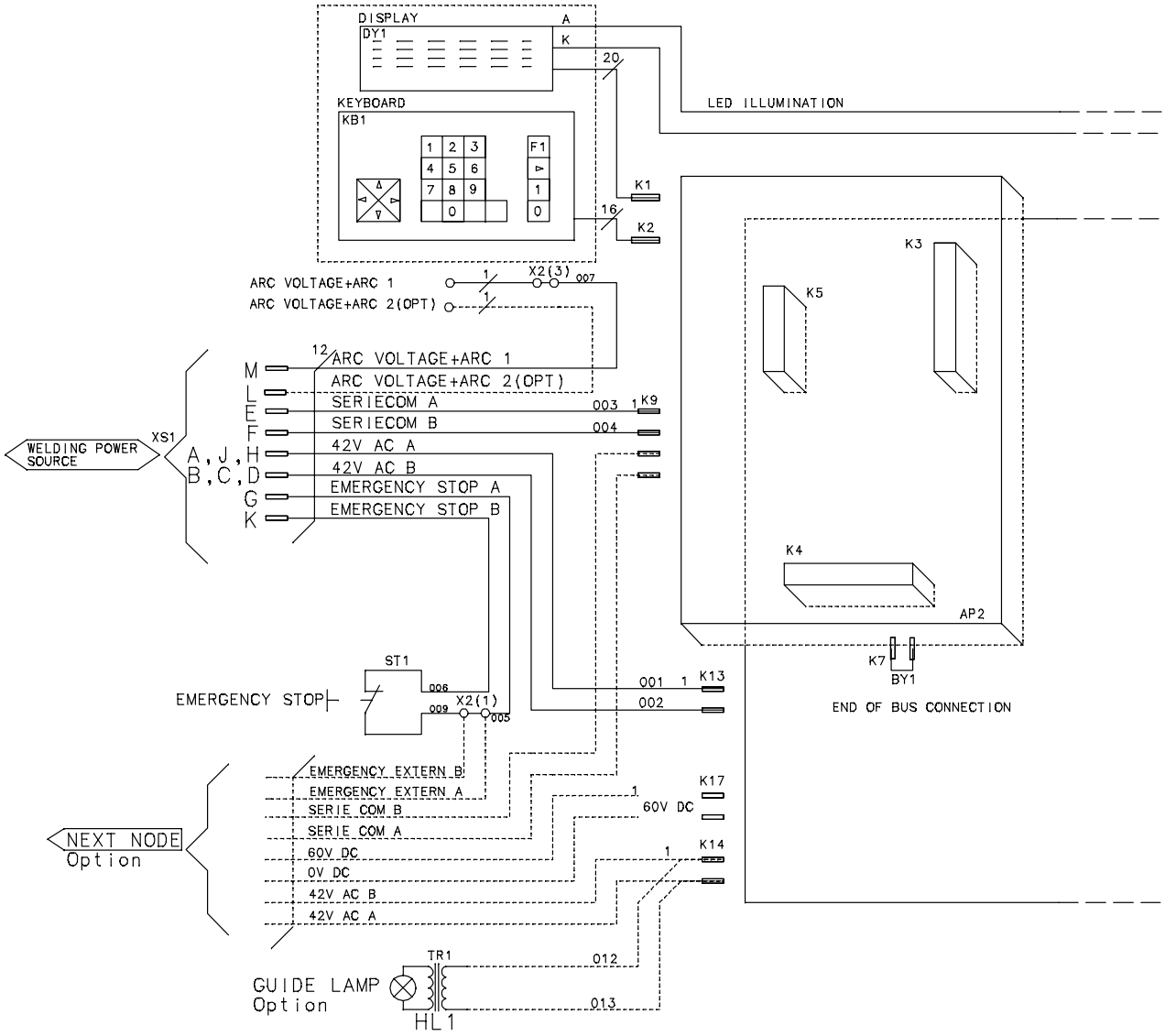
WARNING

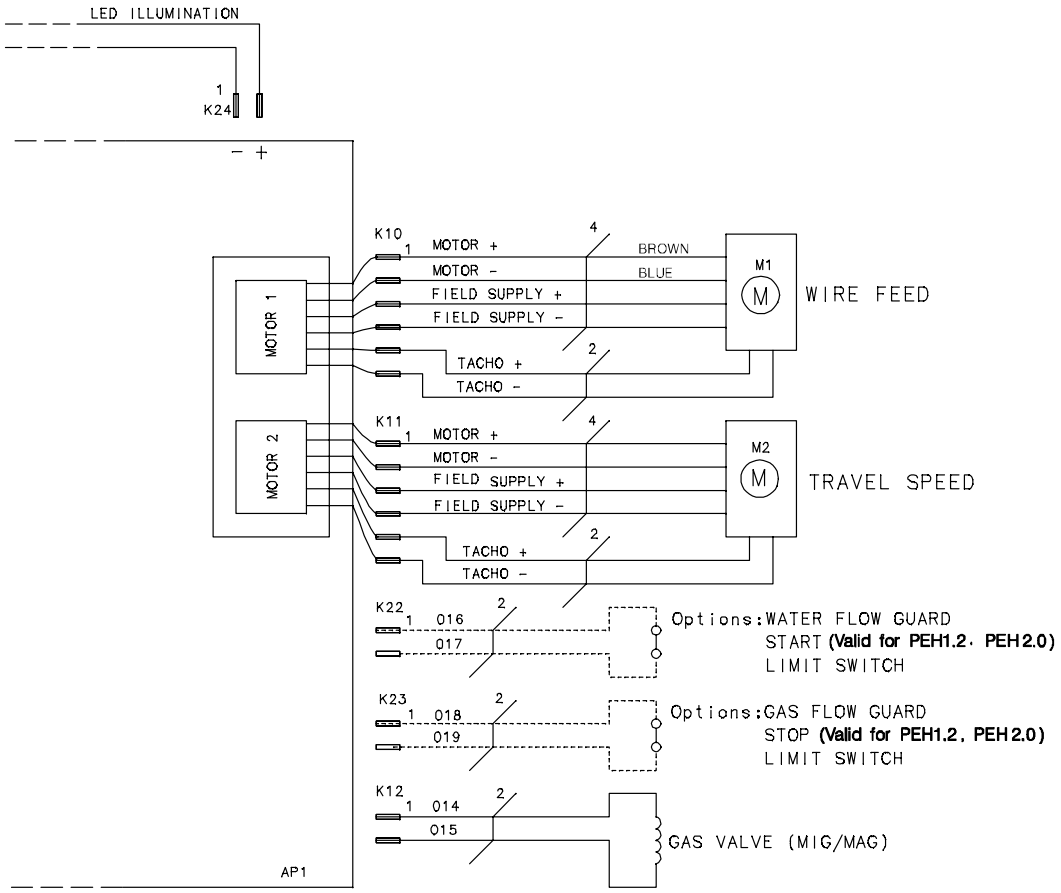
This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the users responsibility to take adequate precautions.

COMPONENT DESCRIPTION

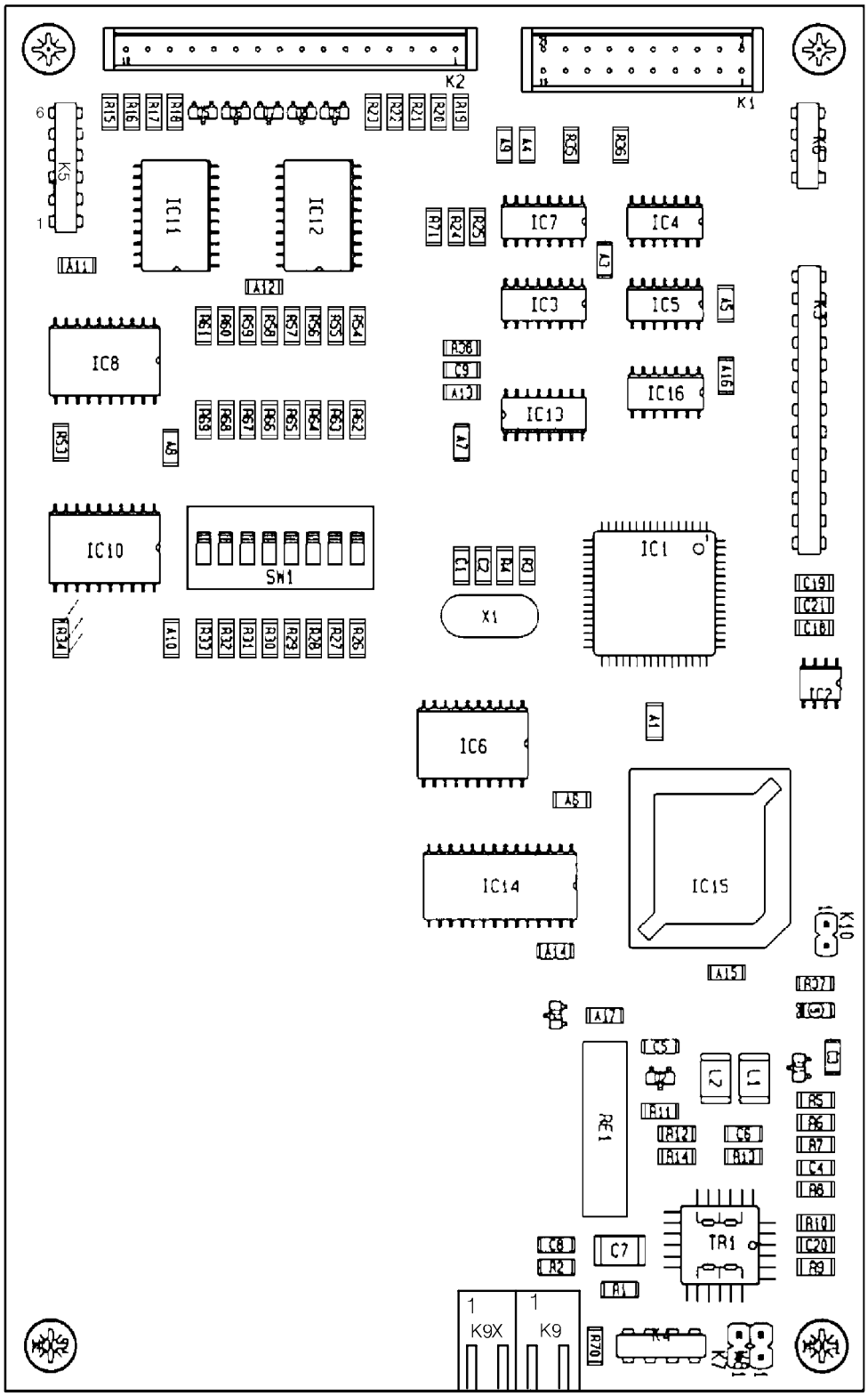
AP1	DC DUO circuit board: see the function description on page 11.
AP2	NME circuit board: see the function description on page 10.
DY1	Display
HL1	Pilot lamp (accessory)
KB1	Control panel (see page 54)
K1	Connector for the graphic display.
K2	Keyboard connector
K3	Connector between the DC DUO circuit board and the NME board.
K5	Circuit board contact K5:1 is normally closed K5:2 is connected to the display control voltage supply K5:3 is connected to + 5 V K5:4 is connected to + 5 V K5:5 is connected to 0 V K5:6 is connected to 0 V
K7	Bus termination (on NME circuit board)
K9	Connection of the serial bus connection
K10	Connector for the wire feed motor (M1)
K11	Connector for the travel motor (M2)
K12	Connector for the gas valve
K13	42 V AC (input from power source)
K14	42 V AC (Pilot lamp)
K17	60 V DC
K22	Connector for the water flow monitor, limit switch or external start function (valid for program version PEH1.2 and PEH2.0).
K23	Connector for the gas flow monitor, limit switch or external stop function (valid for program version PEH1.2 and PEH2.0).
M1	Wire feed motor.
M2	Travel motor
ST1	Emergency stop (see page 32 (PEH1.00A, PEH1.1, PEH1.2), page 48 (PEH2.0) or page 54)
XS1	Connector 12-pin (connector for the control cable from the welding power source).
X2	Terminal block (emergency stop, arc voltage)

CONNECTION DIAGRAM




LED ILLUMINATION
1
K24
- +
K10
1
MOTOR +
MOTOR -
FIELD SUPPLY +
FIELD SUPPLY -
TACHO +
TACHO -
4
2
BROWN
BLUE
M1
M
WIRE FEED
MOTOR 1
K11
1
MOTOR +
MOTOR -
FIELD SUPPLY +
FIELD SUPPLY -
TACHO +
TACHO -
4
2
M2
M
TRAVEL SPEED
MOTOR 2
K22
1
016
017
2
Options:WATER FLOW GUARD
START (Valid for PEH1.2, PEH2.0)
LIMIT SWITCH
K23
1
018
019
2
Options:GAS FLOW GUARD
STOP (Valid for PEH1.2, PEH2.0)
LIMIT SWITCH
K12
1
014
015
2
GAS VALVE (MIG/MAG)
AP1

COMPONENT POSITIONS ON CIRCUIT BOARD AP2



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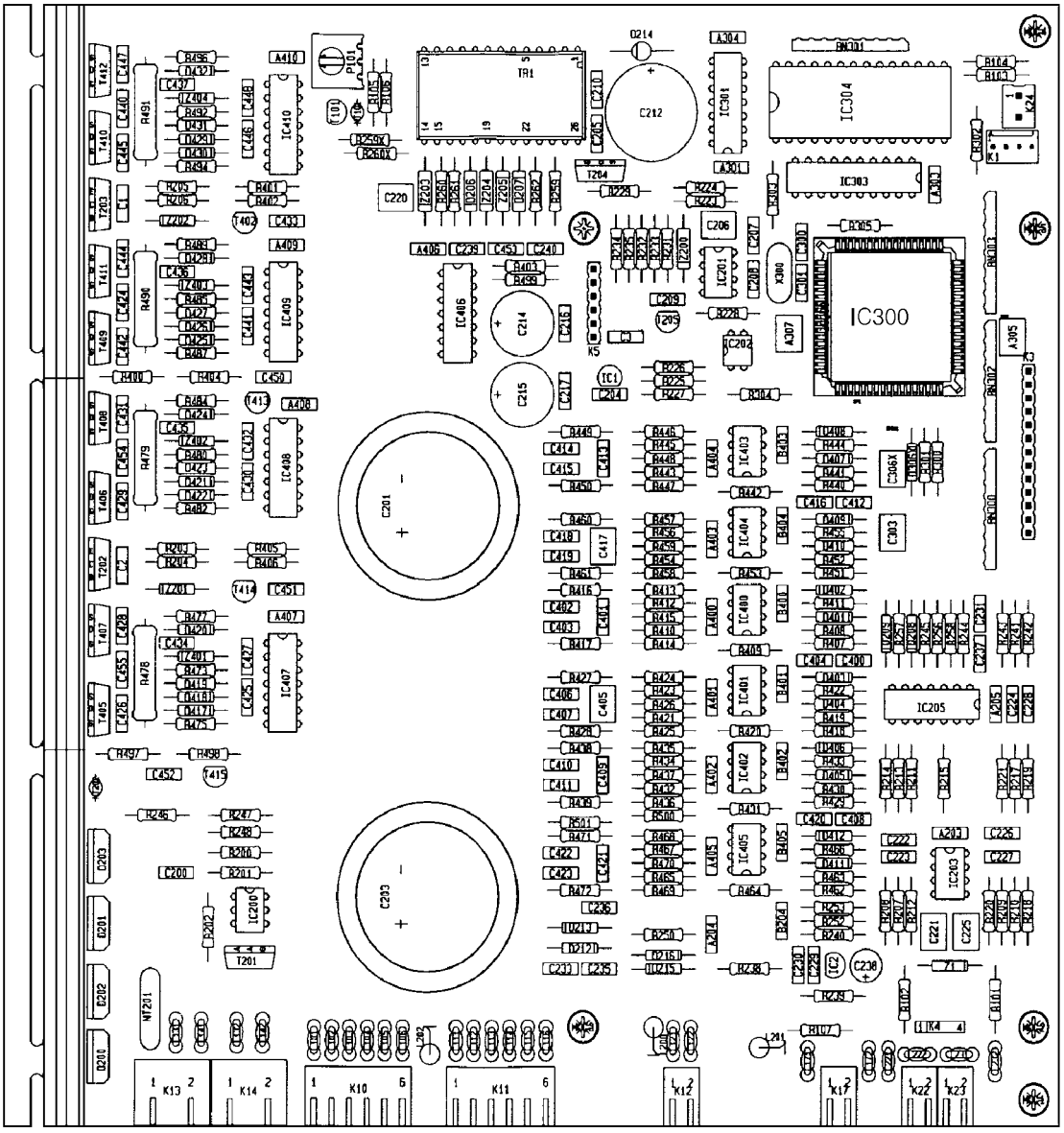
COMPONENT POSITIONS ON CIRCUIT BOARD AP1



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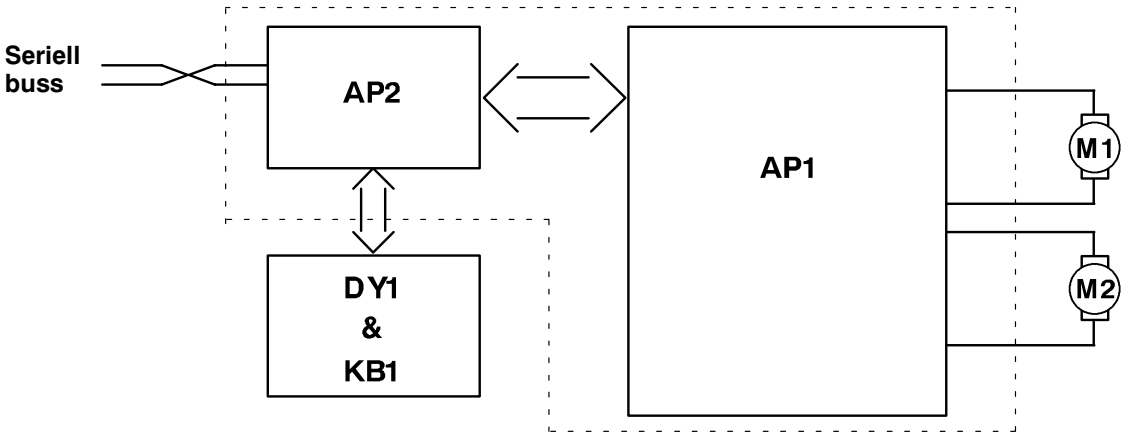
FUNCTION DESCRIPTION (CIRCUIT BOARD)



GENERAL

The drive unit consists of two circuit boards, named **NME** (AP2) and **DC DUO** (AP1).

(See Page 8 and Page 9 for component positions on the circuit boards.)

The **NME board** deals with all communication with the higher level system via a two-wire serial bus. It also manages the control panel (KB1) and the display (DY1), as well as communication with the DC DUO circuit board processor (IC300).

The **DC DUO board** controls the speed of two DC motors, which may be separately excited or of permanent magnet type. Speed control is effected either by measurement of the armature voltage or by tachometer control.

NME (AP2)

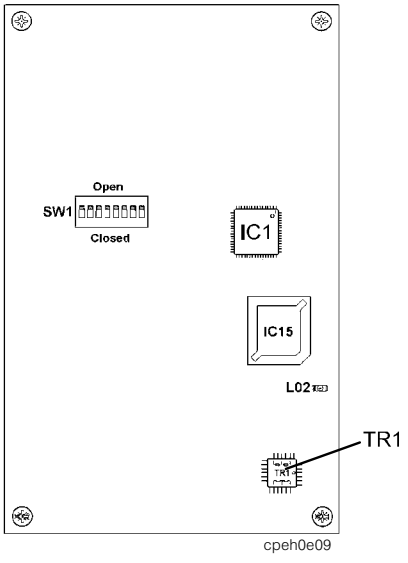
This board is built up around an MC 143150 Neuron processor (IC1), with associated memory working memory and program memory (IC15) and necessary address decoding.

An 8-pole DIP switch (SW1) on the board is used to set the board's system address.

As immunity to interference is particularly important, communication is galvanically isolated through transformer TR1.

The communication is disconnected by a single-pole relay, when the board is not powered but still connected to the system.

Communication with the DC DUO circuit board is via a parallel bus.



DC DUO (AP1)

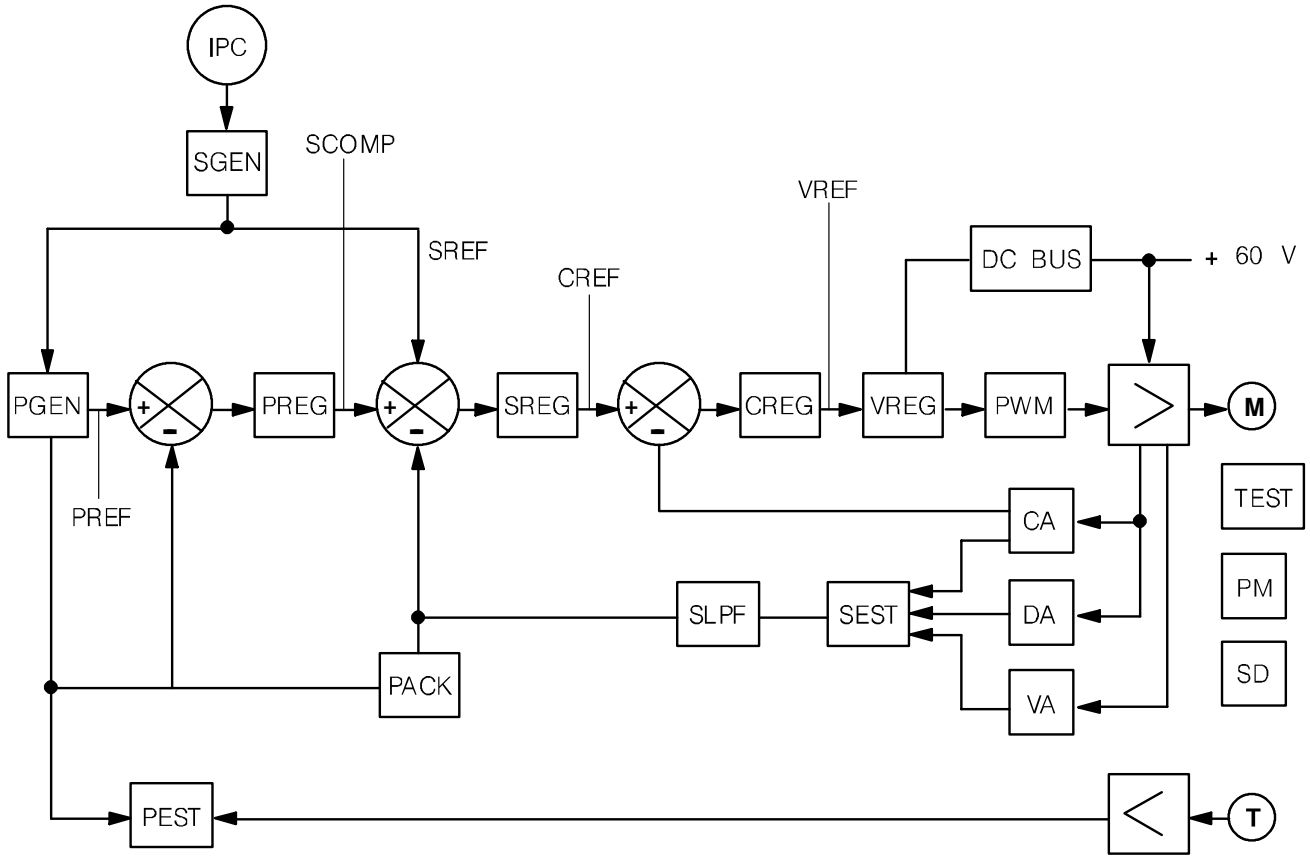
The DC DUO circuit board can be divided into five function blocks:

1. Internal power supply
   Generates the necessary power supplies for the electronic circuitry.
2. The processor (IC300)
   Controls the motors and communication with the NME circuit board.
   The microprocessor controls the motors by measuring their armature voltages, the available DC bus voltage and the motor currents.
3. Analogue part
   Converts the measured quantities from the power section to voltage levels that allow A/D conversion.
4. Power section
   Consists of two full-wave MOSFET transistor bridges and associated drive circuits and current shunts.
5. Inputs and outputs
   For connection of the gas valve, guards, limit switch and the external start/stop function (valid for program version PEH1.2 and PEH2.0).

In the interests of a robust system, the heat sinks on which the power semiconductors are mounted, also carry a thermistor that monitors the temperature of the heat sinks.

Protection against short circuits is provided by a high-speed overload protection circuit that shuts down the power section if a short circuit occurs.

MOTOR REGULATOR STRUCTURE



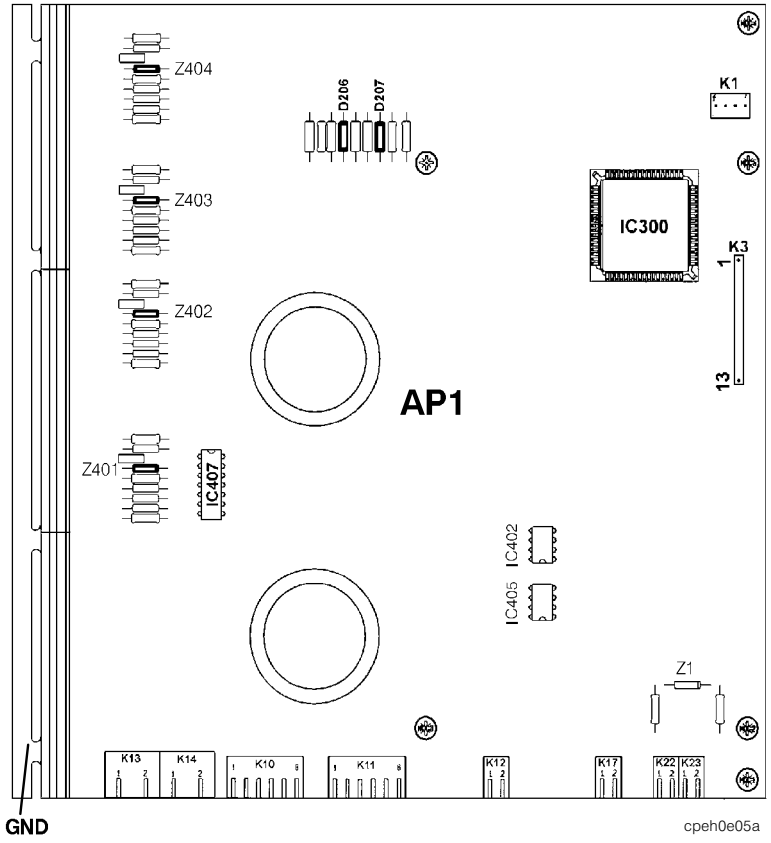
CA	=	Current
DA	=	Differential current
VA	=	Voltage
PWM	=	Pulse width modulation
DC BUS	=	DC supply voltage
VREG	=	Voltage regulator
VREF	=	Voltage reference
CREG	=	Current regulator
SREG	=	Speed regulator
SLPF	=	Low pass filter
SEST	=	Speed estimation
PACK	=	Position acknowledge
PEST	=	Position estimation
PREG	=	Position regulator
PM	=	Process manager
SD	=	Self diagnostics
TEST	=	Test routine
IPC	=	Inter processor communication

M	=	Motor
T	=	Tachometer (AC-tacho)
PGEN	=	Position generator
PREF	=	Position reference

TEST POINTS

TESTING THE EXTERNAL POWER SUPPLY (FROM THE WELDING POWER SOURCE)

- Measure the voltage at contact K13.
  The voltage is OK if 37,8 $V_{AC} \leq U_{AC} \leq$ 46,2 V_{AC}



TESTING THE INTERNAL POWER SUPPLY VOLTAGES

- The following test measurements can be made when the motor is not running.

  Connect a voltmeter across the following components (negative to GND) :

	Set value	**Approved value range**
Positive connected to K17:1	+60V	53 $V_{DC} \leq U \leq$ 65 V_{DC}
Positive connected to K1:1	+5V	4,8 V $\leq U \leq$ 5,2 V
Positive connected to cathode D206	+12V	10,5V $\leq U \leq$ 13,5V
Positive connected to anode D207	-12V	-13,5V $\leq U \leq$ -10,5V
Positive connected to cathode Z402	+15 A	13V $\leq U \leq$ 16V
Positive connected to cathode Z401	+15 B	13V $\leq U \leq$ 16V
Positive connected to cathode Z403	+15 C	13V $\leq U \leq$ 16V
Positive connected to cathode Z404	+15 D	13V $\leq U \leq$ 16V
Positive connected to cathode Z1	+12V_{switch}	11 V $\leq U \leq$ 13V

CHECKING THAT THE PROGRAM IS RUNNING

Measure the signal on K3:12 using an oscilloscope, and make sure that it is constant at +5V.
If the program is not running normally, the signal will go low.
The software will then perform a reset and the signal will again go high.

CHECKING NO. 1 OUTPUT STAGE

1. Issue a RUN command.
2. Check the voltage on IC407:11. It should normally be low, at 0V.
3. Check the waveform on IC407:5. It must be a square wave with 50 % pulse width and an amplitude close to +60 V.

CHECKING NO. 2 OUTPUT STAGE

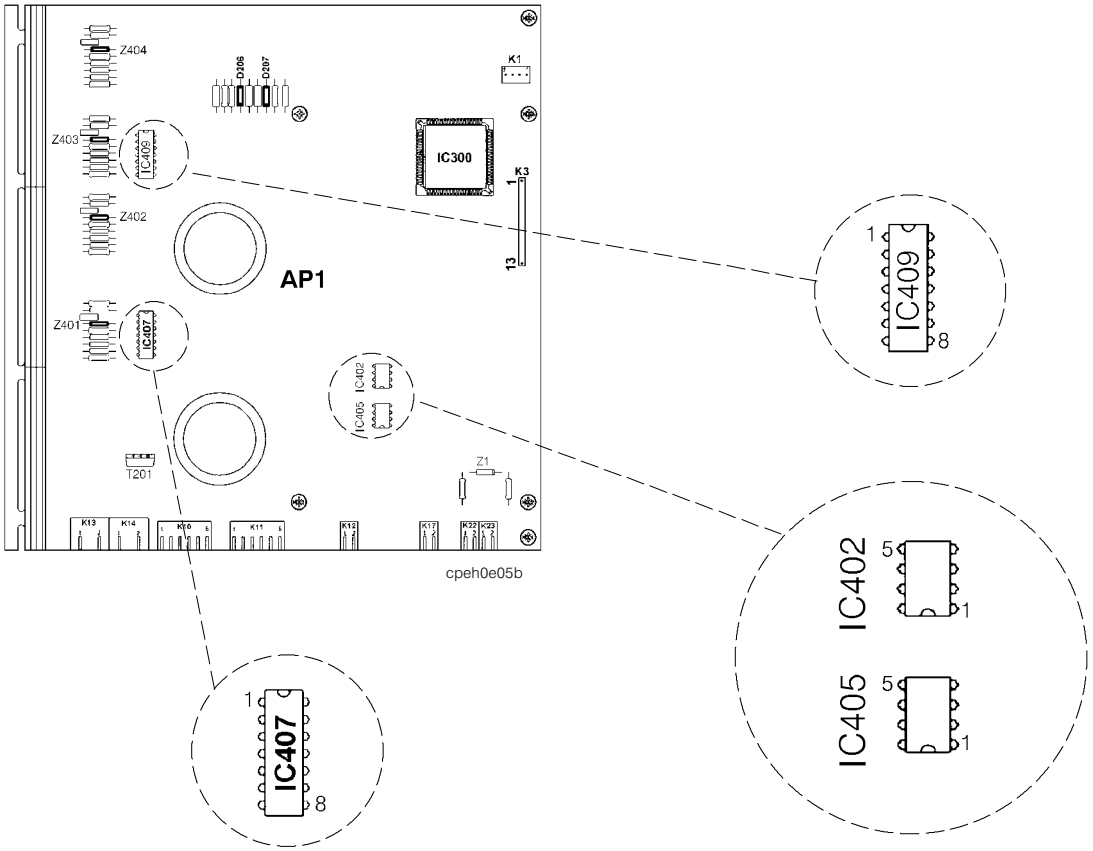
1. Issue a RUN command.
2. Check the voltage on IC407:11. It should normally be low, at 0V.
3. Check the waveform on IC409:5. It must be a square wave with 50 % pulse width and an amplitude close to +60 V.

GAS VALVE OUTPUT CONTROL

Press F1 and measure the voltage over K12.1 and K12.2 (42 V AC). If there is no voltage available, either T201 is defective or the current path on the card is burnt-off.

MEASURING THE MOTOR CURRENT

The current through motor M1 (the wire feed motor) can be measured at IC402: 7, while the current through motor M2 (the travel motor) can be measured at IC405:7 (1 V is equivalent to 5 A).



INSTALLATION

GENERAL

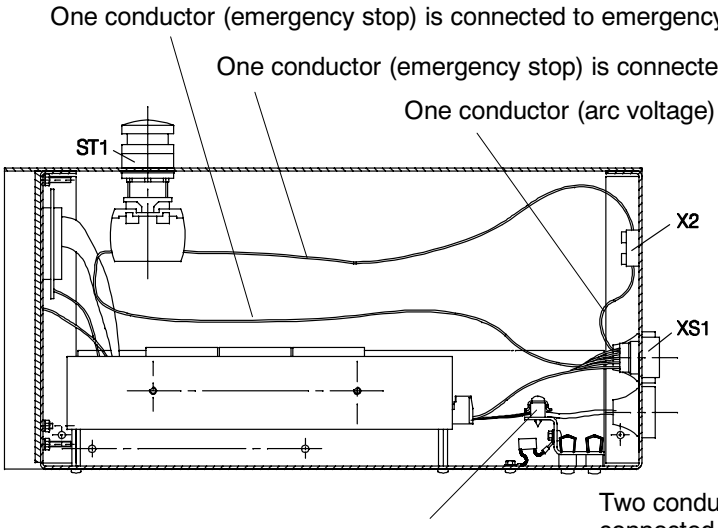
See pages 10 and 18 for information on the DC DUO and NME circuit boards.

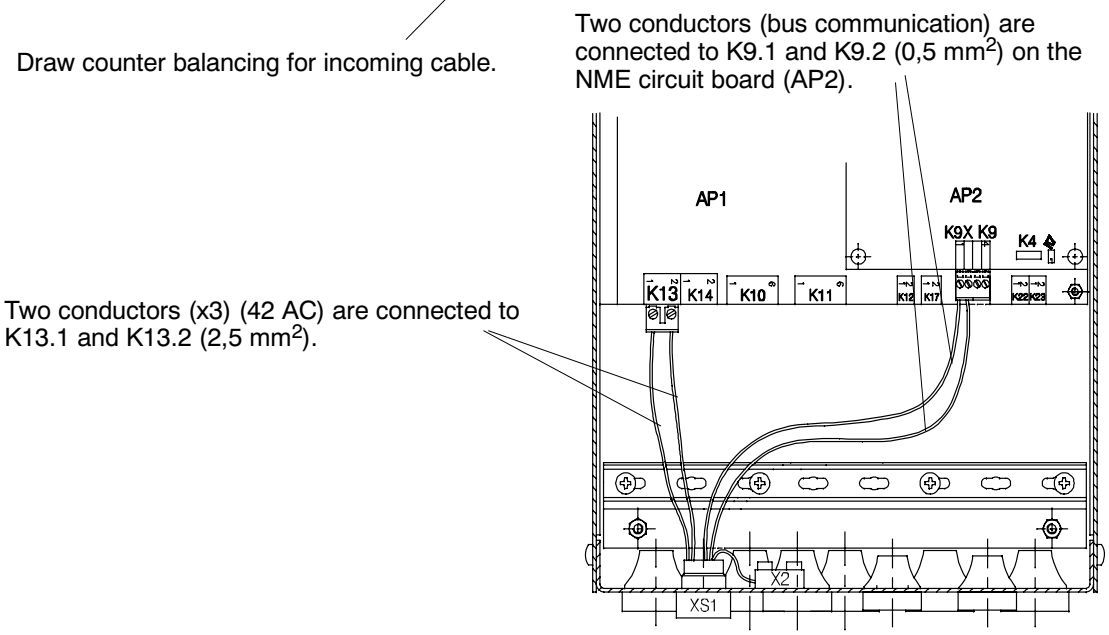
The incoming power supply (42 V AC) to the A2-A6 Process Controller (PEH) is obtained from the welding power source via the control cable, which also carries the bus communication between the two units.

See the connection diagram on page 6.

INTERNAL CONNECTIONS

- Connect incoming cables to the 12-pole contact connector (XS1) and the circuit board contacts on the inside of the control unit. All the cables are screened, and the screens must be connected to the earth points intended for them.
- The 12-pole connector, XS1, is connected internally to circuit board connectors K13 and K9 and to terminal block X2.





EXTERNAL CONNECTIONS

Motor connections for the wire feed motor, M1

A2 motor
Motor cable, two conductors and screen, connected to connectors K10.1 and K10.2.
AC–Tachometer cable (extra accessory), two conductors and screen, connected to connectors K10.5 and K10.6.

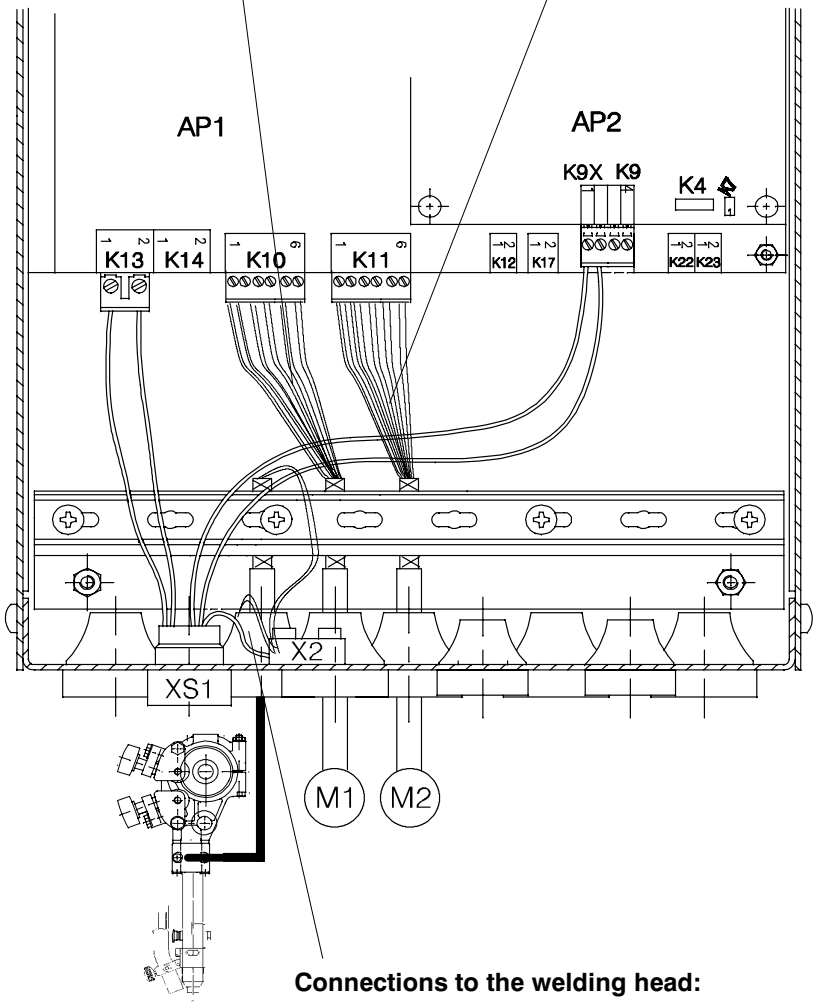
A6 motor
Motor cable, four conductors and screen, connected to connectors K10.1 and K10.2, with the field connections made to K10.3 and K10.4.
The AC tachometer cable is connected to connectors K10.5 and K10.6.

Motor connections for travel motion (travel motor M2)

Motor cable, two conductors with screen, connected to connectors K11.1 and K11.2.

The motor field winding is connected to K11.3 and K11.4 (with screen).

The AC tachometer cable (extra accessory): two conductors and screen, connected to K11.5 and K11.6.



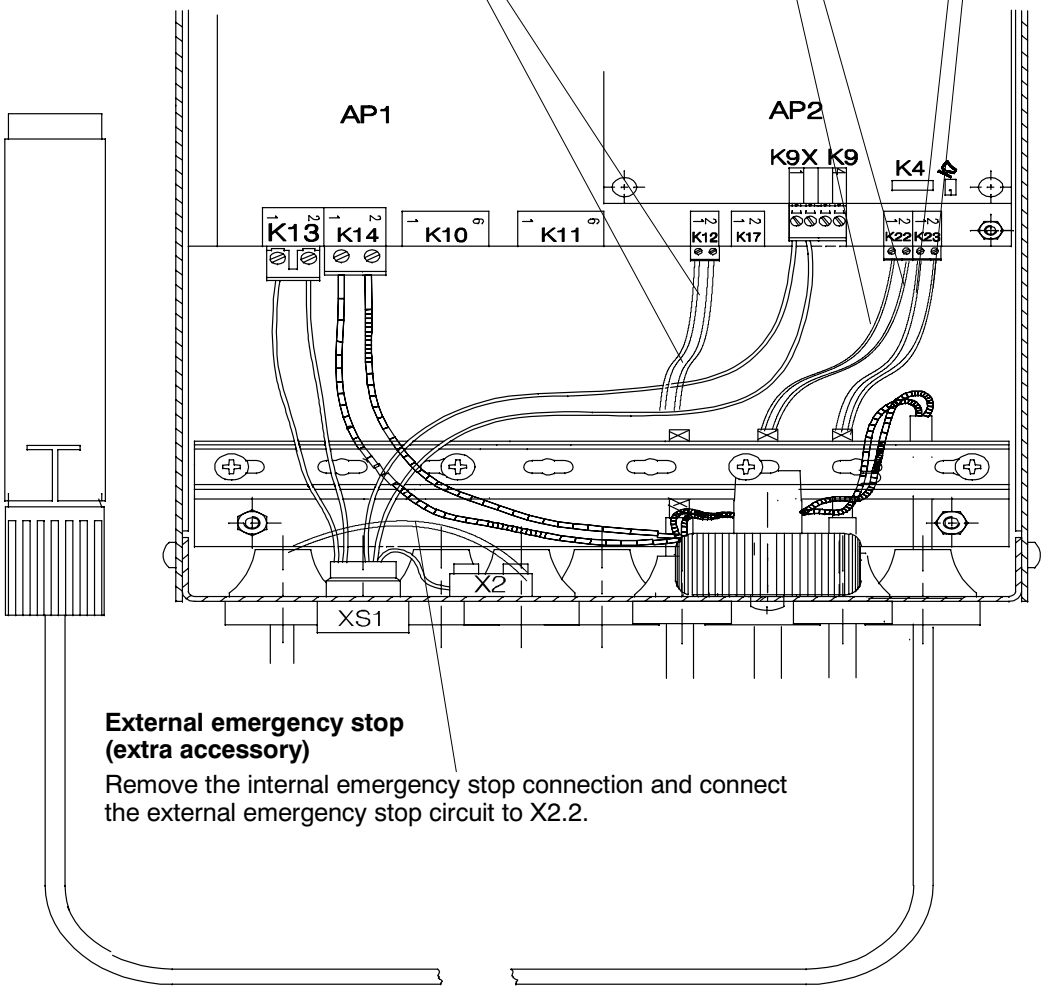
Connections to the welding head:

Arc voltage to terminal X2.1

Input for connection of a gas flow switch (NC), limit switch or external stop function (valid for program version PEH1.2 and PEH2.0).
Screened 2-wire 2 x 0,75 mm^2, connected to K23.1 and K23.2

Input for connection of a water flow switch (NC), limit switch or external start function (valid for program version PEH1.2 and PEH2.0).
Screened 2-wire 2 x 0,75 mm^2, connected to K22.1 and K22.2

Output for connecting a flux or gas valve, 42 V AC max. 0,5 A
Screened 2-wire 2 x 0,75 mm^2, connected to K12.1 and K12.2.



External emergency stop (extra accessory)

Remove the internal emergency stop connection and connect the external emergency stop circuit to X2.2.

Pilot lamp (extra accessory)

Connect the transformer primary (42V) to K14.1 and K14.2.
The transformer and pilot lamp are included in a complete set of components for incorporation in the unit (extra accessory) and must be ordered separately.

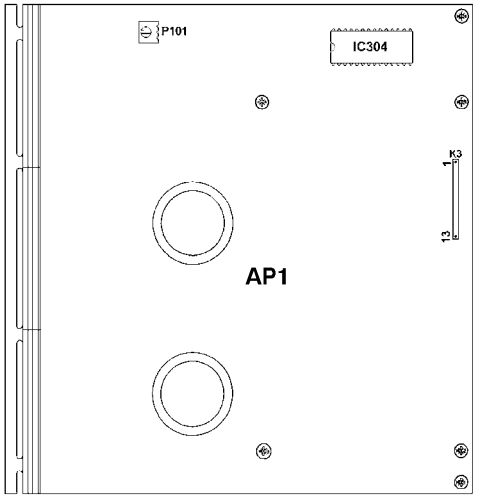
DC DUO

Adjusting the display contrast

As delivered, the lighting is set for the best contrast. If necessary, it can be adjusted by potentiometer **P101**

Motor control software

The motor control program is stored in an EPROM, **IC 304.** It is marked to show the version number of the software supplied.



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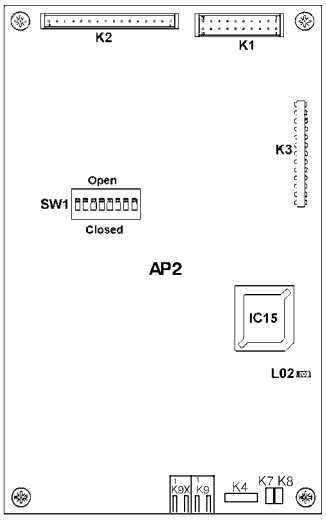
NME

The graphic display is to be connected to connector K1.

The keyboard is to be connected to connector K2.

The bus connection in the control cable (from the welding power source) is to be connected to connector K9.



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DIP switch

The NME circuit board carries a DIP switch (SW1) which is preset on delivery for use with A2-A6 units, and its settings must not be altered in the field. When supplied as a spare part, the settings of the switch must be checked, and adjusted if necessary, before the board is fitted in an A2-A6 Process Controller (PEH).

Setting the DIP switch SW1:

All eight poles of DIP switch SW1 must always be in closed position.

Communications software

The communications software, the keyboard controller, display driver and the trim parameters for the motor circuit board are stored in flash memory **IC15.** The chip is mounted in a socket and can be changed.

Diagnostics

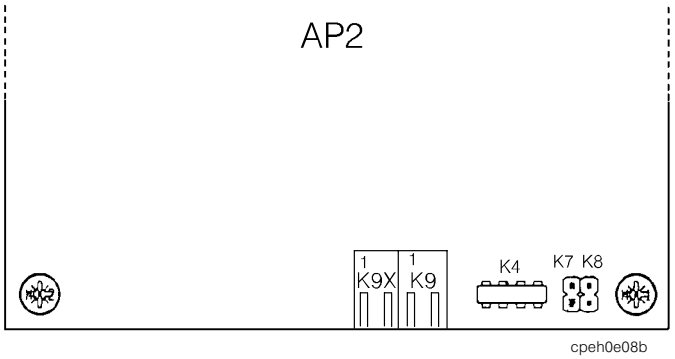
There is one LED on the circuit board that can be used for system fault tracing:

- LED **L02 RED** lights to indicate failure of communication to the DC DUO board, or in the event of a microprocessor fault.

Bus termination/connection

When the NME circuit board is the first or last board in a network, a short-circuiting link must be fitted in socket K7.

When the board is being used in an intermediate position in a network, the short-circuiting link must be fitted in socket K8.



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Connection between DC DUO and NME

The NME circuit board is a separate unit that is secured above the DC DUO circuit board by means of four screws.

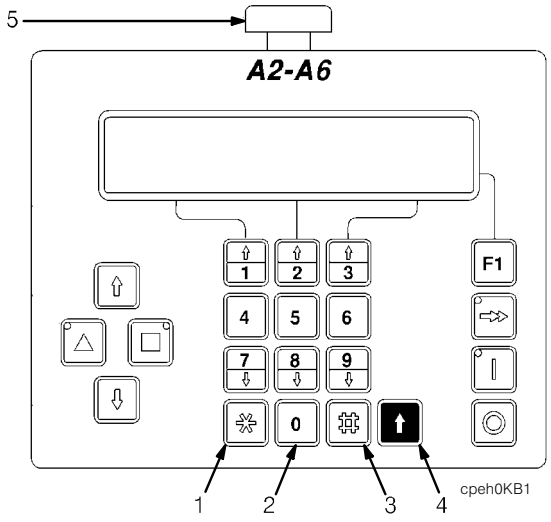
Connectors K3 (communication between the boards), K4 (guard inputs and gas valve output) and K5 (supply voltage for the NME circuit board) provide the electrical link between the two boards.

PRESET SYSTEM MENU FOR PEH1.00A, PEH1.1 AND PEH1.2

CONTROL PANEL

1. Change menu
2. Numerical key, number entry
3. ENTER key, Change row
4. SHIFT key
5. Emergency stop

See page 54 for an explanation of the functions of the other keys.



GENERAL

The **PRESET SYSTEM MENU** is used to configure the equipment connected to the A2–A6 Process Controller (PEH) to give the correct performance of the complete system.

The control unit variables are set to their optimum settings before the equipment is delivered from ESAB, and should not normally need to be changed when the equipment has been supplied to the customer.

If changing any of the variables, use the product codes for ESAB's A2–A6 automatic welding machines or for other systems that can be directly connected to the control system.

The product code includes information on gear ratios, motor types, drive rollers, diameters etc.

- In the **MAIN MENU**, press [*] to get to the **WELDING SETUP** menu.
- Scroll forward to **PRESET SYSTEM MENU** by pressing [⊞].
  When this menu is selected, press [*].
  (If the system is password–protected, this must be entered while **PRESET SYSTEM MENU** is selected, followed by pressing [*])

The display now shows a number of parameters that can be altered in Column A, with their current settings in Column B (see the table for **PRESET SYSTEM MENU** on page 21). Other alternatives that can be selected are displayed one after the other.

USING THE "PRESET SYSTEM" MENU

- To change a setting, move from Column A to Column B with ✲.
- Find the required alternative with ⌗ or with ⬆ + ⌗ or, for rows 3-7 and row 10, enter your own values.
- Return to Column A to move to another row with ⬆ + ✲.
- Move to the next row with ⌗.
- Row 1 returns as the next row after row 10.
- Move back to the previous row with ⬆ + ⌗.
  (This also provides a direct move from row 1 to row 10.)
- To reach the respective sub-menus on rows 8 and 9, select the required menu and press ✲.
- Return to the previous menu with ⬆ + ✲.

Jump forward a whole page by pressing F1 and return by pressing ⬆ + F1.

Explanation of symbols:

⬆ shown in combination with another key means that ⬆ must be pressed first, and then held while the second key is pressed.

SYSTEM FUNCTION SETTINGS AVAILABLE

PRESET SYSTEM MENU		
	A	**B**
1	Product code (see page 22)	A2TFE / A2TGE / A6TFE / A6TGE / FREE/ A2TFF *(valid for PEH1.1, PEH1.2)*/ A2TGF *(valid for PEH1.1, PEH1.2)*
2	Weld process (see page 28)	SAW / MIG/MAG / ESW *(valid for PEH1.2)*
3	Gas preflow (s) (see page 28)	1-99
4	Gas postflow (s) (see page 28)	1-99
5	Password (see page 29)	XXXXX
6	Cable length (m) (see page 29)	X
7	Cable area (mm2) (see page 29)	X
8	DISPLAY MENU (see page 30)	
9	ERROR LIST (see page 32)	
10	Test (see page 33)	1 (ON) / 0 (OFF)

Functions 1-10 are explained on pages 22 - 33.

DEFINITIONS

The starting point for altering functions 1 - 10 is selection of the **PRESET SYSTEM MENU,** see page 21.

1. Product code

System configuration uses product codes that are explained below. Selection of the appropriate product codes automatically also selects the correct details of the motor types and gear ratios used in the particular product.

- Select the **Product code** row and press .
- Scroll forward to the required product code by pressing .

  Alternatives available:

A2TFE	A2 submerged arc automatic welding machine
A2TGE	A2 MIG/MAG automatic welding machine
A2TFF *(valid for PEH1.1 and PEH1.2)*	A2 submerged arc automatic welding machine
A2TGF *(valid for PEH1.1 and PEH1.2)*	A2 MIG/MAG automatic welding machine
A6TFE	A6 submerged arc automatic welding machine
A6TGE	A6 MIG/MAG automatic welding machine
FREE	Any configuration of connections from two motors to the drive board. (For available drive motors and gears, see table **FREE** below.)

- To select **FREE**, select it and press .
- Press to move from Column A to Column B.
- Press + to move from Column B to Column A.

Function settings available for FREE:

FREE	
A	**B**
Wire feed axis (see page 23)	A6F/ A6G/ A2F/A2G/ MEK4/ FREE1/ *(A6T/ A2T *(valid for PEH1.00A)*/ A2TE *(valid for PEH1.1, PEH1.2)*/ A2TF *(valid for PEH1.1, PEH1.2)*/ FREE2)
Travel axis (see page 24)	A6T/ A2T *(valid for PEH1.00A)*/ A2TE *(valid for PEH1.1, PEH1.2)*/ A2TF *(valid for PEH1.1, PEH1.2)*/ FREE2/ **(A6F/ A6G/ A2F/ A2G/ MEK4/ FREE1)
Binary inputs (see page 26)	Not used/ Guards/ Limit sw/ Start/stop *(valid for PEH1.2)*
DRIVE TRIM MENU (see page 27)	

* The product codes in brackets are **not normally** used as wire feed motors.
** The product codes in brackets are **not normally** used as travel motors.

“Wire feed axis”

Select wire feed motor here.

Alternatives:

A6F . . . . . VEC 4000 r/min, art.no. 145 063 906 with 1:156 gear ratio

A6G . . . . . VEC 8000 r/min, art.no 145 063 909 with 1:74 gear ratio

A2F . . . . . FHP 36 r/min, art.no 334 678 001 KSV 5035/375

A2G . . . . . FHP 68 r/min, art.no 334 678 002 KSV 5035/374

MEK4 . . . . FHP 258 r/min, art.no 455 077 001 KSV 5035/603

FREE1 . . . . Any required motor alternative (see the **FREE1** table on page 23).
N.B. When selecting this alternative, settings must be made for both motors and gears.

Available function settings for **FREE1:**

FREE1 (Press ✲ to reach the sub-menu)	
A	**B**
Motor	FHP36/ FHP68/ FHP258/ VEC4000/ VEC8000/ *(DUNKER1/ DUNKER2)
Gear 1	A2TW/ MEK24/ 74A6/ FREE1/ 156A6/ **(1:1/ A6TA/ A2TA/ A6TB/ A2TB/ A2TC *(valid for PEH1.1, PEH1.2)*/ FREE2/ FREE3/ FREE4)
Gear 2	1:1/ **(74A6/ 156A6/ MEK24/ A6TA/ A2TA/ A2TW/ A6TB/ A2TB/ A2TC *(valid for PEH1.1, PEH1.2)*/ FREE1/ FREE2/ FREE3/ FREE4)
P.D. mm	1-10000
Encoder ppr	0-10000
Tacho poles *(valid for PEH1.00A)*	0 / 6
LOW MANUAL SPEED	1-1000
HIGH MANUAL SPEED	1-5000
Calibrate speed *(valid for PEH1.00A)*	X

* The motor codes in brackets are **not normally** used as wire feed motors.
** The gear ratio codes in brackets are **not normally** used as travel motors.

Note that in the rows for P:D.mm, Encoder ppr, LOW MANUAL SPEED and HIGH MANUAL SPEED you enter your own values if necessary.

P.D. mm is the feed roller diameter (effective diameter of the gearwheel).

Encoder ppr is the number of pulses per revolution or tacho pulses per revolution.

Tacho poles *(valid for PEH1.00A)* indicates the number of poles/revolution.

The function **Calibrate speed** *(valid for PEH1.00A)* is unstable and should not be used.

FREE1/ **FREE2**/ **FREE3** and **FREE4** (Column B) are explained on page 25.

“Travel axis”

Select travel motor here.

Alternatives:

A6T	Dunker 2, art.no 334 658 880 for A6 tractor with 1:187,5 gear ratio
A2T *(valid for PEH1.00A)*	Dunker 1, art.no 332 967 880 for A2 tractor with 1:750 gear ratio
A2TE *(valid for PEH1.1, PEH1.2)* ...	Dunker 1, art.no 332 967 880 for A2 tractor with 1:750 gear ratio
A2TF *(valid for PEH1.1, PEH1.2)* ...	MEK4/51 for A2 Weldtrac with 1:51 gear ratio
FREE2	Any required motor alternative (see the **FREE2** table on page 24). N.B. When selecting this alternative, settings must be made for both motors and gears.

***Available function settings for* FREE2:**

FREE2 (Press ✲ to reach the sub-menu)	
A	**B**
Motor	DUNKER1/ DUNKER2/ FHP258/ VEC8000/ VEC4000/ *(FHP36/ FHP68)
Gear 1	A6T *(valid for PEH1.1, PEH1.2)*/ A2TE *(valid for PEH1.1, PEH1.2)*/ A2TF *(valid for PEH1.1, PEH1.2)*/ 156A6/ 74A6/ FREE3/ **(1:1/ MEK24/ A6TA/ A2TA/ A2TW/ A6TB/ A2TB/ A2TC *(valid for PEH1.1, PEH1.2)*/ FREE1/ FREE2/ FREE4)
Gear 2	1:1/ FREE4/ **(74A6/ 156A6/ MEK24/ A6TA/ A2TA/ A2TW/ A6TB/ A2TB/ A2TC *(valid for PEH1.1, PEH1.2)*/ FREE1/ FREE2/ FREE3)
P.D. mm	1-10000
Encoder ppr	0-10000
Tacho poles *(valid for PEH1.00A)*	0 / 6
LOW MANUAL SPEED	1-1000
HIGH MANUAL SPEED	1-5000
Calibrate speed *(valid for PEH1.00A)*	X

* The motor codes in brackets are **not normally** used as wire feed motors.
** The gear ratio codes in brackets are **not normally** used as travel motors.

Note that in the rows for P:D.mm, Encoder ppr, LOW MANUAL SPEED and HIGH MANUAL SPEED you enter your own values if necessary.

P.D. mm is the feed roller diameter (effective diameter of the gearwheel).

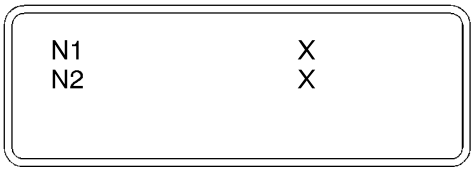
Encoder ppr is the number of pulses per revolution or tacho pulses per revolution.

Tacho poles *(valid for PEH1.00A)* indicates the number of poles/revolution.

The function **Calibrate speed** *(valid for PEH1.00A)* is unstable and should not be used.

FREE1/ **FREE2**/ **FREE3** and **FREE4** (Column B) are explained on page 25.

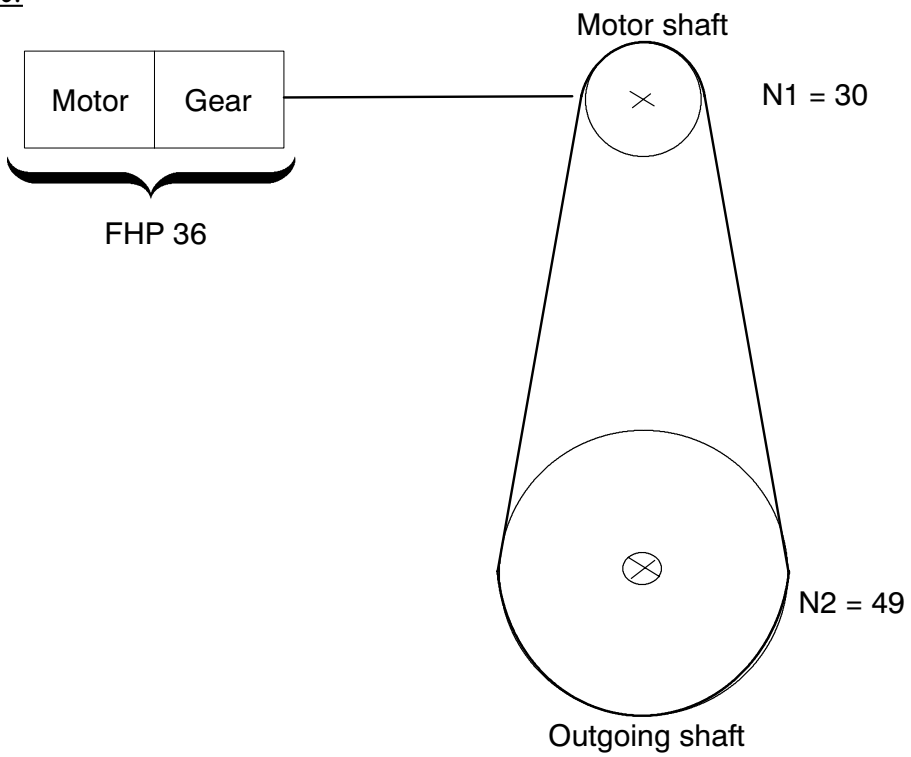
When selecting **FREE1** / **FREE2** / **FREE3** or **FREE4** (column B) the display below is shown.



By entering values for N1 and N2 any gear ratio located after the motor gears (for example **FHP 36**) can be selected.

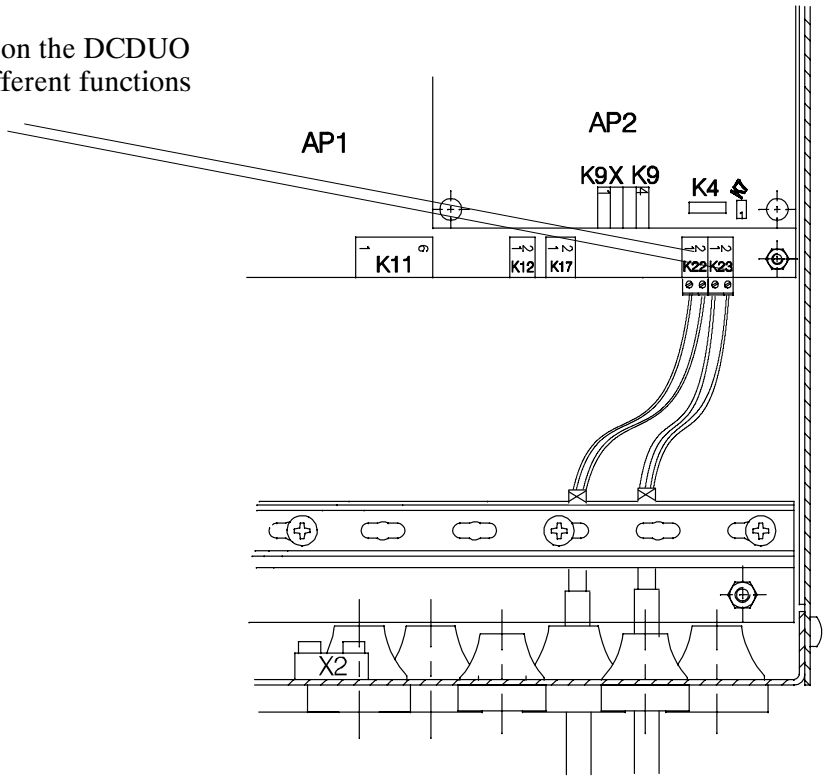
N1 = the number of teeth of the gear wheel of the motor shaft.
N2 = the number of teeth of the gear wheel of the outgoing shaft.

Example:



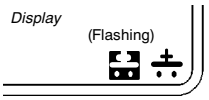
"**Binary inputs**"

The inputs K22 and K23 on the DCDUO board can be assigned different functions on this sub-menu.

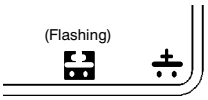


Adjusting and using the inputs are only possible if the product code ***FREE*** has been selected. If other product codes (fixed ones) are selected the inputs will not be active.

The contact function of a transducer connected to the inputs shall normally be closed (NC). When the switch (Guards or Limit switch) is opened this will be indicated in the bottom right part of the display by a flashing contact symbol.



Inlet K22 is open.



Inlet K23 is open.

The following alternative settings can be made on the ***Binary inputs*** menu:

Not used

The inputs are not active.

Guards

2 transducers (water and gas flow guards with normally closed (NC) contact function) can be connected.
Note. If only one transducer is connected the other input must be bridged.

Limit switch

Limit switches (with normally closed (NC) contact function) are to be connected to the inputs. When one of the limit switches is activated (opened) the motion of the motor ceases, and only the motion in the opposite direction is possible.

Start/stop *(Valid for program version PEH1.2)*

The function is used when external start and stop of the welding is desired. A starting contact (closing NO) is to be connected to input K22. The stop function is to be connected to K23.

“DRIVE TRIM MENU”

Use this menu to set up the required parameter and setting values for the PEH electronics.
Data settings are stored in the IC15 flash memory chip (see page 18).
The settings are therefore unique for each electronic unit and are shown in this menu.

- Select **DRIVE TRIM MENU** and press .

Actual trimming data are now displayed.

The preset values for an untrimmed electronics card are shown in the table on page 28.
The values for a trimmed electronics card will differ from those of the *Preset Values*.

Set your own offset values for the wire feed motor (M1) VXPoffset 32768, and for the travel motor (M2) VYPoffset 32768.

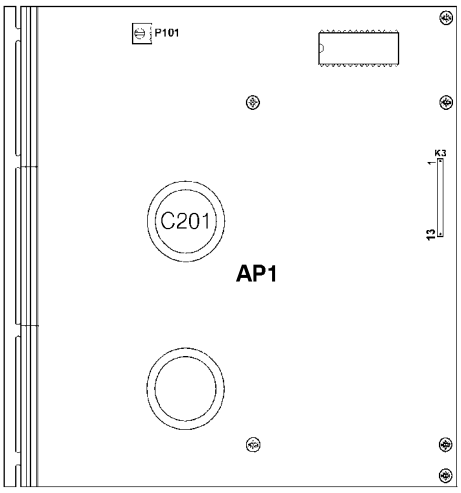
Example of how to adjust the offset error of the travel motor:

- Mark the line **VXPoffset** and press .
- Enter the desired value, for example 32868.
- Return to the **MAIN MENU** by holding + down.

The value of the VXP offset is now 32868.

Proceed in the same way to adjust the offset error VYPoffset 32768 of the travel motor.

If necessary, trimming data for the respective electronics card can be ordered from ESAB.
When ordering trimming data, the **manufacturing number** must be indicated (to be found on the DC DUO card, capacitor C201).



Name Trim menu	Trimming Default values	Explanation (meaning)
VNscale	20480	Power supply to DC bus
VXPoffset	32768	Positive voltage offset, wire feed motor
VXNoffset	32768	Negative voltage offset, wire feed motor
CXPoffset	32768	Positive current offset, wire feed motor
CXNoffset	32768	Negative current offset, wire feed motor
VYPoffset	32768	Positive voltage offset, travel motor
VYNoffset	32768	Negative voltage offset, travel motor
CYPoffset	32768	Positive current offset, travel motor
CYNoffset	32768	Negative current offset, travel motor
VXPscale	19200	Positive armature voltage measurement / speed-controlled wire feed
VXNscale	19200	Negative armature voltage measurement / speed-controlled wire feed
CXPscale	3200	Positive armature current measurement
CXNscale	3200	Negative armature current measurement
VYPscale	19200	Positive armature voltage measurement / speed-controlled travel motor
VYNscale	19200	Negative armature voltage measurement / speed-controlled travel motor
CYPscale	3200	Positive armature current measurement
CYNscale	3200	Negative armature current measurement

2. Weld process

Depending on which program version is being used either two or three alternatives can be selected: **SAW, MIG/MAG** or **ESW**.

- SAW for submerged arc welding
- MIG/MAG for gas metal arc welding
- ESW for electro-slag welding (cladding) *(valid for program version PEH1.2)*

3. Gas preflow (s) (only for MIG/MAG)

The protective gas must start to flow before the arc is struck in order to provide time for it to cover the weld position. A suitable preflow time must therefore be loaded into the system, and this is done by entering the required time, in seconds, into the selected field.

Times between 1 and 99 seconds can be entered. The default value is 1 second.

4. Gas postflow (s) (only for MIG/MAG)

The protective gas must continue to flow after the arc is extinguished in order to protect the weld while it cools. A suitable postflow time must therefore be loaded into the system, and this is done by entering the required time, in seconds, into the selected field.

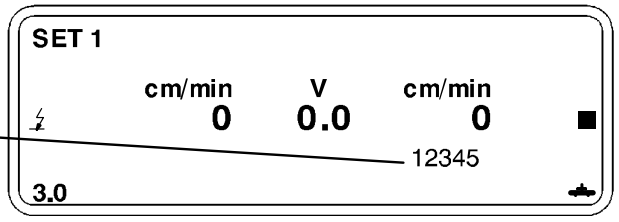
Times between 1 and 99 seconds can be entered. The default value is 2 seconds.

5. Password

Access to the **PRESET SYSTEM MENU** can be protected by entering a password in the **Password** field.
The password must consist of not more than five numerals, XXXXX.
If no password is required, enter the numerical value 0. If the password consists of more than one numeral, press [0] a few times until there is only one 0.

The password that has been entered can be shown in the **MAIN MENU** display by entering [↑] + [2]

For example if the password is 12345 the display will show:



6. Cable length (m)

The arc voltage is noticeably affected by the impedance of the cable. The impedance is affected by such factors as the length and cross-sectional area of the cable. This effect is particularly marked when using AC welding current sources.

The volt drop that occurs in long cables can be compensated for by entering the exact length of the cable being used.

The total length of the cable in metres (welding current and return current cables together) must be entered in Column B (see page 21). A maximum of five figures may be used.

7. Cable area (mm2)

Enter the cross-sectional area of the cable in mm^2 in Column B (see page 21).
A maximum of five figures may be used.

8. DISPLAY MENU

This menu controls how the information on the display is presented: language, units and other information can be varied as required.

- Select the **DISPLAY MENU** row and press .

In Column A, the display now shows functions that can be altered, with the current choices in Column B (see below).

Example:

How to select English from the **DISPLAY MENU:**

- Select Language from Column A and press
- Find English by pressing or by pressing + .
- Return to Column A by pressing +
- Return to the **MAIN MENU** with +

English has now been selected as the display language.

Available settings for DISPLAY MENU:

DISPLAY MENU	
A	**B**
Language	Svenska / Dansk / Norsk / Suomi / English / Deutsch / Francaise / Nederlands / Espanol / Italiano / Portugues/ E_ _hnika
Unit	Metric / Inches
Current display	Set value / Real value
Heat input	On / Off
Font	Small / Large
Parameter set	X

The available settings for **DISPLAY MENU** are explained on page 31.

Language

Svenska=Swedish / Dansk=Danish / Norsk=Norwegian / Soumi=Finnish /
English=English / Deutsch=German / Francaise=French / Nederlands=Dutch /
Espanol=Spanish / Italiano=Italian / Portugues=Portuguese / E_ _hnika = Greek.

Units

Metric, Inches

Speeds, lengths or wire sizes in the **MAIN MENU** can be displayed in either metric units or inches.

Current

Set value, Real value

The welding parameters can be displayed as either set values or real values. The set values are stable and are not subject to rapid fluctuations. On the other hand, if information on the actual welding current is required, select **real** value and the current will be shown in figures on the **MAIN MENU** display.

Heat input

On, Off

This shows how much energy is supplied to the weld, calculated from the set values of voltage and current. It is displayed on the **MAIN MENU** as kJ/cm.

Font

Small, Large

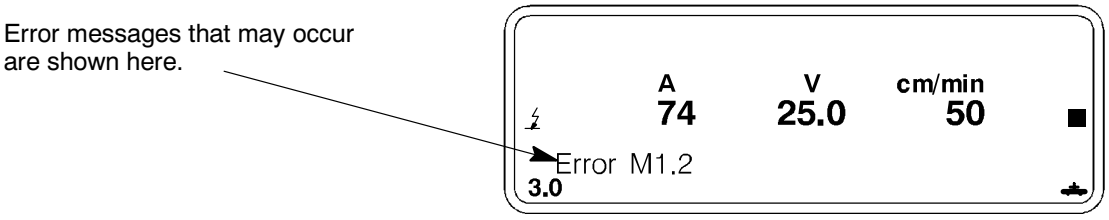
Selects small or large display figures for the welding parameters.

Parameter set

This specifies the number of parameter sets to be used: a maximum of ten is allowed. Enter a numerical for the number of sets in Column B. The default value is 1.

9. ERROR LIST

Error messages are displayed on the bottom row of the **MAIN MENU**.



When an error message is displayed, it overwrites the information that it normally displayed on the bottom row (welding preset values).

See page 33 for a list of error codes.

Error categories

Emergency stop (see page 20)

A special emergency stop function that is activated by pressing the emergency stop pushbutton in dangerous situations (e.g. risk of injury etc.).

When the reason for the emergency stop has been corrected, the emergency stop function can be reset by deactivating the emergency stop pushbutton.

Alarm

Conditions that could result in unacceptable defects in the process and which automatically generate an emergency stop. When such a fault occurs, the error message must be acknowledged by pressing after the fault has been corrected.

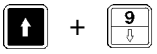
Error messages shown on the bottom line of the display.

Incorrect entry of numerical values

If incorrect numerical values are entered (e.g. for voltage, current or speed), a message is generated indicating the values that are allowed.

Error messages are displayed in sequence by the system and can be inspected in the **ERROR LIST** menu. The system can store up to 20 messages, after which the oldest messages are erased as new messages are added at the top of the list.

- Select the **ERROR LIST** line and press .
- Step through the list with .

  To erase the errors press 
- Return to the **PRESET SYSTEM MENU** with .

Error codes

The following codes generated by the DC DUO board can be shown on the display:

M1.3	Overheating	Stop	Wait until temperature has fallen
Wire feed motor (Motor 1)			
M1.1	Tacho fault	Stop	Check travel motor / gearbox
M1.2	Current too high	Stop	Check wire feed
Travel motor (Motor 2)			
M2.1	Tacho fault	Stop	Check travel motor / gearbox
M2.2	Current too high	Stop	Check travel motor / gearbox
M2.3	Overheating *(valid for PEH1.00A)*	Stop	Wait until temperature has fallen
Welding power source (T1)			
T1.01	Communication error	Stop	Check cables and connections
T1.51	Incorrect welding voltage	Stop	Check joint preparation
T1.52	Incorrect current	Stop	Check joint preparation
T1.53	Unsuccessful start	Stop	Check stick-out and welding parameters
T1.54	Current limit	Stop	Welding short-circuited / Cure short-circuit
T1.55	Thermostat / overheating	Stop	Wait until temperature has fallen
T1.56	Voltage loss *(valid for PEH1.00A)*	Stop	Loss of power, check fuses
T1.57	Arc extinguished	Stop	Check wire feed
Inputs / outputs			
Display (Flashing)	No cooling water (inlet K22 open) *	Stop	Check if the water is flowing or if the limit switch is open.
(Flashing)	No gas flow (inlet K23 open) *	Stop	Check gas pressure

* These inputs are activated by entries in the **Product code** menu / **FREE** / Binary inputs (see page 22).

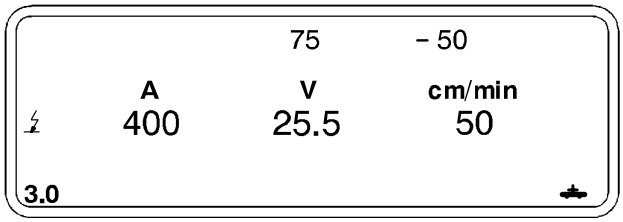
10. Test

When this menu is active, the main menu displays information that is normally hidden.

Activate the menu by entering the numerical value 1 in Column B (see the table on page 21).

Loss of voltage deactivates the **"Test"** menu.

Speed commands (in cm/min) are shown when the **"Test"** menu is active.
Wire feed speed commands are shown in the centre of the top line of the display.
Welding travel speed commands (in cm/min) are shown at the right-hand side of the top line of the display.

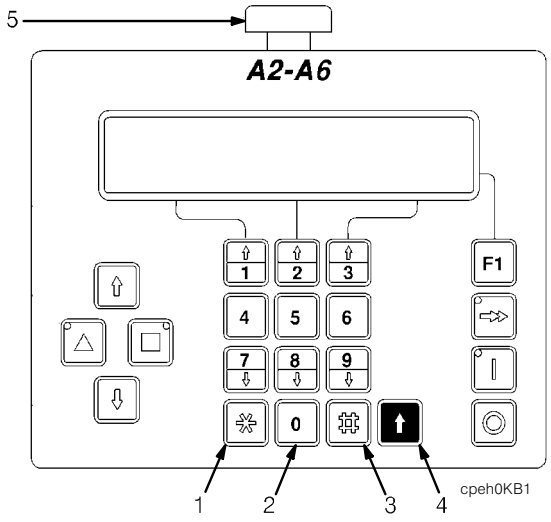


PRESET SYSTEM MENU FOR PEH2.0

CONTROL PANEL

1. Change menu
2. Numerical key, number entry
3. ENTER key, Change row
4. SHIFT key
5. Emergency stop

See page 54 for an explanation of the functions of the other keys.



GENERAL

The **PRESET SYSTEM MENU** is used to configure the equipment connected to the A2–A6 Process Controller (PEH) to give the correct performance of the complete system.

The control unit variables are set to their optimum settings before the equipment is delivered from ESAB, and should not normally need to be changed when the equipment has been supplied to the customer.

If changing any of the variables, use the product codes for ESAB's A2–A6 automatic welding machines or for other systems that can be directly connected to the control system.

The product code includes information on gear ratios, motor types, drive rollers, diameters etc.

- In the **MAIN MENU**, press [*] to get to the **WELDING SETUP** menu.
- Scroll forward to **PRESET SYSTEM MENU** by pressing [#].
  When this menu is selected, press [*].
  (If the system is password–protected, this must be entered while **PRESET SYSTEM MENU** is selected, followed by pressing [*])

The display now shows a number of parameters that can be altered in Column A, with their current settings in Column B (see the table for **PRESET SYSTEM MENU** on page 35). Other alternatives that can be selected are displayed one after the other.

USING THE "PRESET SYSTEM" MENU

- To change a setting, move from Column A to Column B with ✲.
- Find the required alternative with ⚙ or with ⬆ + ⚙ or, for rows 3–7 and row 12, enter your own values.
- Return to Column A to move to another row with ⬆ + ✲.
- Move to the next row with ⚙.
- Row 1 returns as the next row after row 12.
- Move back to the previous row with ⬆ + ⚙.
  (This also provides a direct move from row 1 to row 12.)
- To reach the respective sub-menus on rows 8, 9, 10 and 11, select the required menu and press ✲.
- Return to the previous menu with ⬆ + ✲.

Jump forward a whole page by pressing F1 and return by pressing ⬆ + F1.

Explanation of symbols:

⬆ shown in combination with another key means that ⬆ must be pressed first, and then held while the second key is pressed.

SYSTEM FUNCTION SETTINGS AVAILABLE

PRESET SYSTEM MENU		
	A	**B**
1	Product code (see page 36)	A2TFE / A2TGE / A2TFF / A2TGF / A6TFE / A6TGE / FREE
2	Weld process (see page 42)	SAW / GMAW / ESW
3	Gas preflow (s) (see page 42)	1–99
4	Gas postflow (s) (see page 42)	1–99
5	Password (see page 43)	XXXXX
6	Cable length (m) (see page 43)	X
7	Cable area (mm2) (see page 43)	X
8	START SEQUENCE MENU (see page 44)	
9	STOP SEQUENCE MENU (see page 45)	
10	DISPLAY MENU (see page 46)	
11	ERROR LIST (see page 48)	
12	Test (see page 49)	1 (ON) / 0 (OFF)

Functions 1–12 are explained on pages 36 – 49.

DEFINITIONS

The starting point for altering functions 1 - 12 is selection of the **PRESET SYSTEM MENU**: see page 35.

1. Product code

System configuration uses product codes that are explained below. Selection of the appropriate product codes automatically also selects the correct details of the motor types and gear ratios used in the particular product.

- Select the **Product code** row and press .
- Scroll forward to the required product code by pressing .

  Alternatives available:

A2TFE	A2 submerged arc automatic welding machine
A2TGE	A2 MIG/MAG automatic welding machine
A2TFF	A2 submerged arc automatic welding machine
A2TGF	A2 MIG/MAG automatic welding machine
A6TFE	A6 submerged arc automatic welding machine
A6TGE	A6 MIG/MAG automatic welding machine
FREE	Any configuration of connections from two motors to the drive board. (For available drive motors and gears, see table **FREE** below.)

- To select **FREE**, select it and press .
- Press to move from Column A to Column B.
- Press + to move from Column B to Column A.

Function settings available for FREE:

FREE	
A	**B**
Wire feed axis (see page 37)	A6F/ A6G/ A2F/A2G/ MEK4/ FREE1/ *(A6T/ A2TE/ A2TF/ FREE2)
Travel axis (see page 38)	A6T/ A2TE/ A2TF/ FREE2/ **(A6F/ A6G/ A2F/ A2G/ MEK4/ FREE1)
Binary inputs (see page 40)	Not used/ Guards/ Limit sw / Start/stop
DRIVE TRIM MENU (see page 41)	

* The product codes in brackets are **not normally** used as wire feed motors.
** The product codes in brackets are **not normally** used as travel motors.

“Wire feed axis”

Select wire feed motor here.

Alternatives:

A6F . . . . . VEC 4000 r/min, art.no 145 063 906 with 1:156 gear ratio

A6G . . . . . VEC 8000 r/min, art.no 145 063 909 with 1:74 gear ratio

A2F . . . . . FHP 36 r/min, art.no 334 678 001 KSV 5035/375

A2G . . . . . FHP 68 r/min, art.no 334 678 002 KSV 5035/374

MEK4 . . . . . FHP 258 r/min, art.no 455 077 001 KSV 5035/603

FREE1 . . . . . Any required alternative (see the **FREE1** table on page 37). N.B. When selecting this alternative, settings must be made for both motors and gears.

Available function settings for **FREE1:**

FREE1 (Press ✲ to reach the sub-menu)	
A	**B**
Motor	FHP36/ FHP68/ FHP258/ VEC4000 / VEC8000 / MET3B/ *(DUNKER1/ DUNKER2)
Gear 1	A2TW/ MEK24/ 74A6/ FREE1/ 156A6/ **(1:1/ A6TA/ A2TA/ A6TB/ A2TB/ A2TC/ FREE2/ FREE3/ FREE4)
Gear 2	1:1/ **(74A6/ 156A6/ MEK24/ A6TA/ A2TA/ A2TW/ A6TB/ A2TB/ A2TC/ FREE1/ FREE2/ FREE3/ FREE4)
P.D. mm	1-10000
Encoder ppr	0-10000
LOW MANUAL SPEED	1-1000
HIGH MANUAL SPEED	1-5000

* The motor codes in brackets are **not normally** used as wire feed motors.
** The gear ratio codes in brackets are **not normally** used as travel motors.

Note that in the rows for P:D.mm, Encoder ppr, LOW MANUAL SPEED and HIGH MANUAL SPEED you enter your own values if necessary.

P.D. mm is the feed roller diameter (effective diameter of the gearwheel).

Encoder ppr is the number of pulses per revolution or tacho pulses per revolution.

FREE1/ **FREE2**/ **FREE3** and **FREE4** (Column B) are explained on page 39.

“Travel axis”

Select travel motor here.

Alternatives:

A6T	Dunker 2, art.no 334 658 880 for A2 tractor with 1:187,5 gear ratio
A2TE	Dunker 1, art.no 332 967 880 for A2 tractor with 1:750 gear ratio
A2TF	MEK4/51 for A2 Weldtrac with 1:51 gear ratio
FREE2	Any required alternative (see the **FREE2** table on page 38). N.B. When selecting this alternative, settings must be made for both motors and gears.

Available function settings for **FREE2:**

FREE2 (Press ✲ to reach the sub-menu)	
A	**B**
Motor	DUNKER1/ DUNKER2/ FHP258/ VEC8000/ VEC4000/ MET3B/ *(FHP36/ FHP68)
Gear 1	A6T/ A2TE/ A2TF/ 156A6/ 74A6/ FREE3/ **(1:1/ MEK24/ A6TA/ A2TA/ A2TW/ A6TB/ A2TB/ A2TC/ FREE1/ FREE2/ FREE4)
Gear 2	1:1/ FREE4/ **(74A6/ 156A6/ MEK24/ A6TA/ A2TA/ A2TW/ A6TB/ A2TB/ A2TC/ FREE1/ FREE2/ FREE3)
P.D. mm	1-10000
Encoder ppr	0/ 6
LOW MANUAL SPEED	1-1000
HIGH MANUAL SPEED	1-5000

* The motor codes in brackets are **not normally** used as wire feed motors.
** The gear ratio codes in brackets are **not normally** used as travel motors.

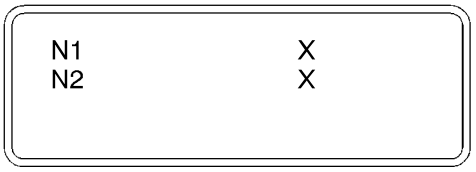
Note that in the rows for P:D.mm, Encoder ppr, LOW MANUAL SPEED and HIGH MANUAL SPEED you enter your own values if necessary.

P.D. mm is the feed roller diameter (effective diameter of the gearwheel).

Encoder ppr is the number of pulses per revolution or tacho pulses per revolution.

FREE1/ **FREE2**/ **FREE3** and **FREE4** (Column B) are explained on page 39.

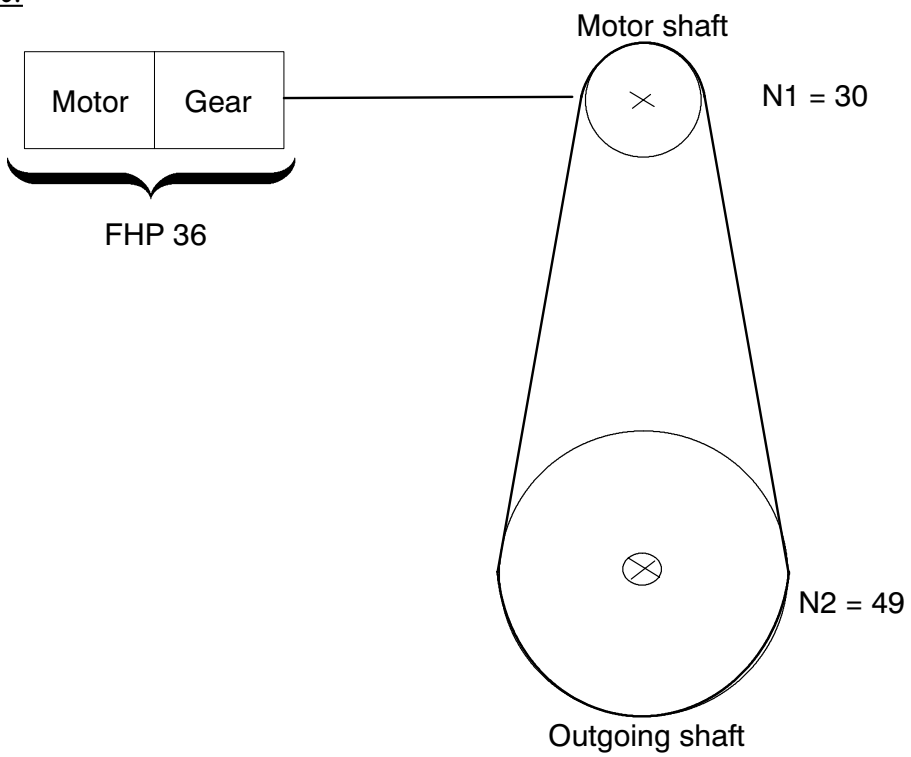
When selecting **FREE1** / **FREE2** / **FREE3** or **FREE4** (column B) the display below is shown.



By entering values for N1 and N2 any gear ratio located after the motor gears (for example **FHP 36**) can be selected.

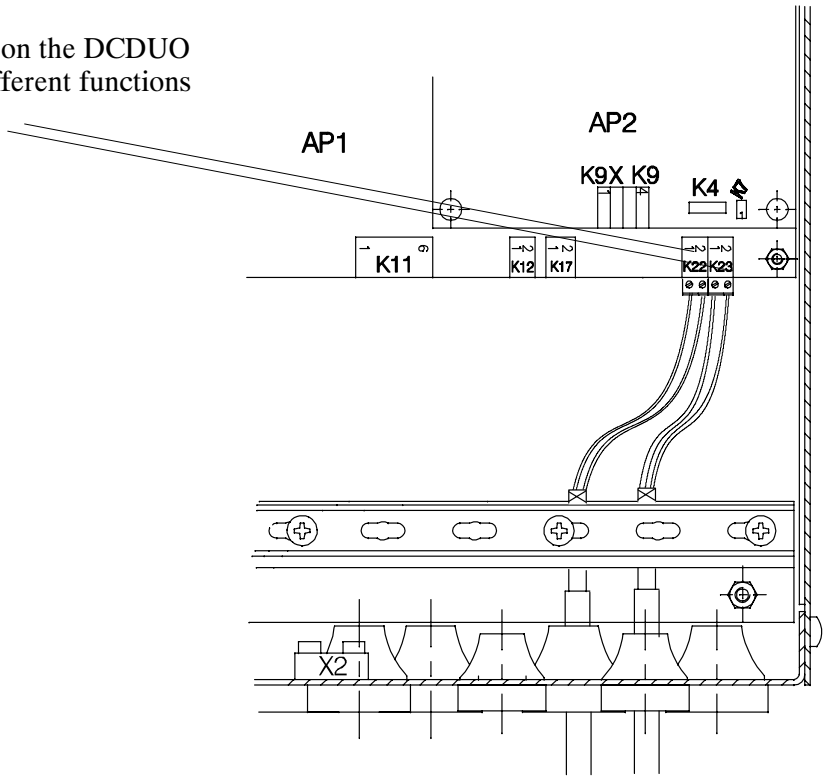
N1 = the number of teeth of the gear wheel of the motor shaft.
N2 = the number of teeth of the gear wheel of the outgoing shaft.

Example:



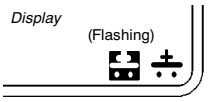
"Binary inputs"

The inputs K22 and K23 on the DCDUO board can be assigned different functions on this sub-menu.

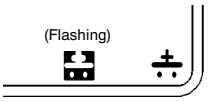


Adjusting and using the inputs are only possible if the product code ***FREE*** has been selected. If other product codes (fixed ones) are selected the inputs will not be active.

The contact function of a transducer connected to the inputs shall normally be closed (NC). When the switch (Guards or Limit switch) is opened this will be indicated in the bottom right part of the display by a flashing contact symbol.



Inlet K22 is open.



Inlet K23 is open.

The following alternative settings can be made on the ***Binary inputs*** menu:

Not used

The inputs are not active.

Guards

2 transducers (water and gas flow guards with normally closed (NC) contact function) can be connected.
Note. If only one transducer is connected the other input must be bridged.

Limit switch

Limit switches (normally with closed (NC) contact function) are to be connected to the inputs. When one of the limit switches is activated (opened) the motion of the motor ceases, and only the motion in the opposite direction is possible.

Start/stop

The function is used when external start and stop of the welding is desired. A starting contact (closing NO) is to be connected to input K22. The stop function is to be connected to K23.

"DRIVE TRIM MENU"

Use this menu to set up the required parameter and setting values for the PEH electronics.
Data settings are stored in the IC15 flash memory chip (see page 18).
The settings are therefore unique for each electronic unit and are shown in this menu.

- Select **DRIVE TRIM MENU** and press .

Actual trimming data are now displayed.

The preset values for an untrimmed electronics card are shown in the table on page 42.
The values for a trimmed electronics card will differ from those of the *Preset Values*.

Set your own offset values for the wire feed motor (M1) VXPoffset 32768, and for the travel motor (M2) VYPoffset 32768.

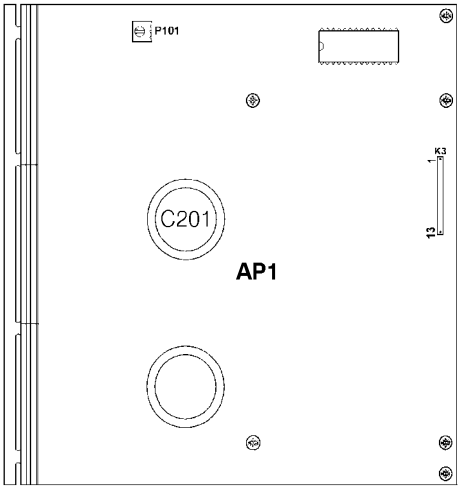
Example of how to adjust the offset error of the travel motor:

- Mark the line **VXPoffset** and press .
- Enter the desired value, for example 32868.
- Return to the **MAIN MENU** by holding + down.

The value of the VXP offset is now 32868.

Proceed in the same way to adjust the offset error VYPoffset 32768 of the travel motor.

If necessary, trimming data for the respective electronics card can be ordered from ESAB.
When ordering trimming data, the **manufacturing number** must be indicated (to be found on the DC DUO card, capacitor C201).



Name Trim menu	Trimming Default values	Explanation (meaning)
VNscale	20480	Power supply to DC bus
VXPoffset	32768	Positive voltage offset, wire feed motor
VXNoffset	32768	Negative voltage offset, wire feed motor
CXPoffset	32768	Positive current offset, wire feed motor
CXNoffset	32768	Negative current offset, wire feed motor
VYPoffset	32768	Positive voltage offset, travel motor
VYNoffset	32768	Negative voltage offset, travel motor
CYPoffset	32768	Positive current offset, travel motor
CYNoffset	32768	Negative current offset, travel motor
VXPscale	19200	Positive armature voltage measurement / speed-controlled wire feed
VXNscale	19200	Negative armature voltage measurement / speed-controlled wire feed
CXPscale	3200	Positive armature current measurement
CXNscale	3200	Negative armature current measurement
VYPscale	19200	Positive armature voltage measurement / speed-controlled travel motor
VYNscale	19200	Negative armature voltage measurement / speed-controlled travel motor
CYPscale	3200	Positive armature current measurement
CYNscale	3200	Negative armature current measurement

2. Weld process

Three alternatives can be selected: **SAW, GMAW** and **ESW**.

- SAW for submerged arc welding
- GMAW for gas metal arc welding
- ESW for electro-slag welding (cladding)

3. Gas preflow (s) (only for MIG/MAG)

The protective gas must start to flow before the arc is struck in order to provide time for it to cover the weld position. A suitable preflow time must therefore be loaded into the system, and this is done by entering the required time, in seconds, into the selected field.

Times between 1 and 99 seconds can be entered. The default value is 1 second.

4. Gas postflow (s) (only for MIG/MAG)

The protective gas must continue to flow after the arc is extinguished in order to protect the weld while it cools. A suitable postflow time must therefore be loaded into the system, and this is done by entering the required time, in seconds, into the selected field.

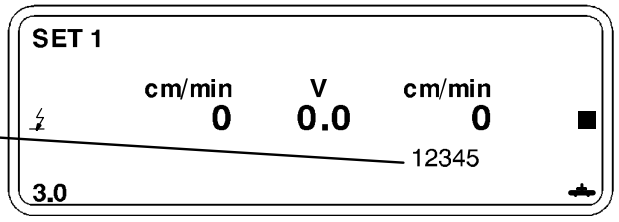
Times between 1 and 99 seconds can be entered. The default value is 2 seconds.

5. Password

Access to the **PRESET SYSTEM MENU** can be protected by entering a password in the **Password** field.
The password must consist of not more than five numerals, XXXXX.
If no password is required, enter the numerical value 0. If the password consists of more than one numeral, press 0 a few times until there is only one 0.

The password that has been entered can be shown in the **MAIN MENU** display by entering ↑ + 2

For example if the password is 12345 the display will show:



6. Cable length (m)

The arc voltage is noticeably affected by the impedance of the cable. The impedance is affected by such factors as the length and cross-sectional area of the cable. This effect is particularly marked when using AC welding current sources.

The volt drop that occurs in long cables can be compensated for by entering the exact length of the cable being used.

The total length of the cable in metres (welding current and return current cables together) must be entered in Column B (see page 35). A maximum of five figures may be used.

7. Cable area (mm2)

Enter the cross-sectional area of the cable in mm^2 in Column B (see page 35).
A maximum of five figures may be used.

8. START SEQUENCE MENU

On some occasions, for example when welding with special electrodes or materials, it can be necessary to make up a special start sequence. The start method can also influence the appearance of the weld bead.

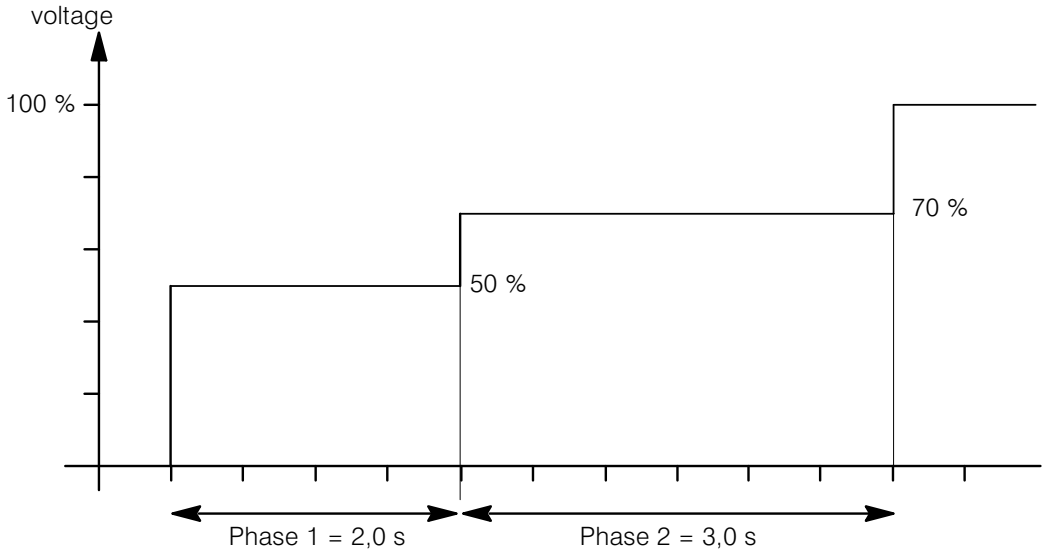
The start sequence is divided into two phases (Phase 1 and Phase 2). The time and percentage values of of the two phases can be adjusted.

Phase 2 has no effect if *t = 0* in Phase 1.

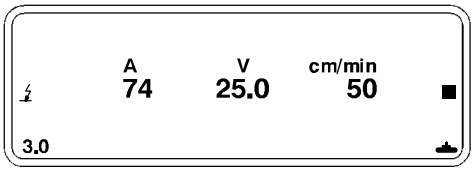
t = the durability of the sequence, indicated in intervals of 0.1 s (max. 9.9 s).

Example:

Phase 1,	voltage	%	50
Phase 1,	current	%	40
Phase 1,	Wire feed	%	50
Phase 2,	time	0,1s	30
Phase 2,	speed	%	80
Phase 2,	voltage	%	70
Phase 2,	current	%	80
Phase 2,	Wire feed	%	90



Current, voltage and speed are adjusted by indicating a percentage value of the welding parameters on the main menu.



Max. adjustable value is 150% as long as the capacity of the welding power source and the max. possible welding speed are not exceeded.

When the welding parameters are changed through the over-ride function, the values in the start sequence are changed correspondingly (see page 59).

9. STOP SEQUENCE MENU

The stop sequence menu is mainly used for programming the crater filling. It is programmed in the same way as the start sequence menu.

The condition for activating the STOP SEQUENCE MENU is that the *crater filling* is set to 0, see the menu WELDING SETUP on page 61.

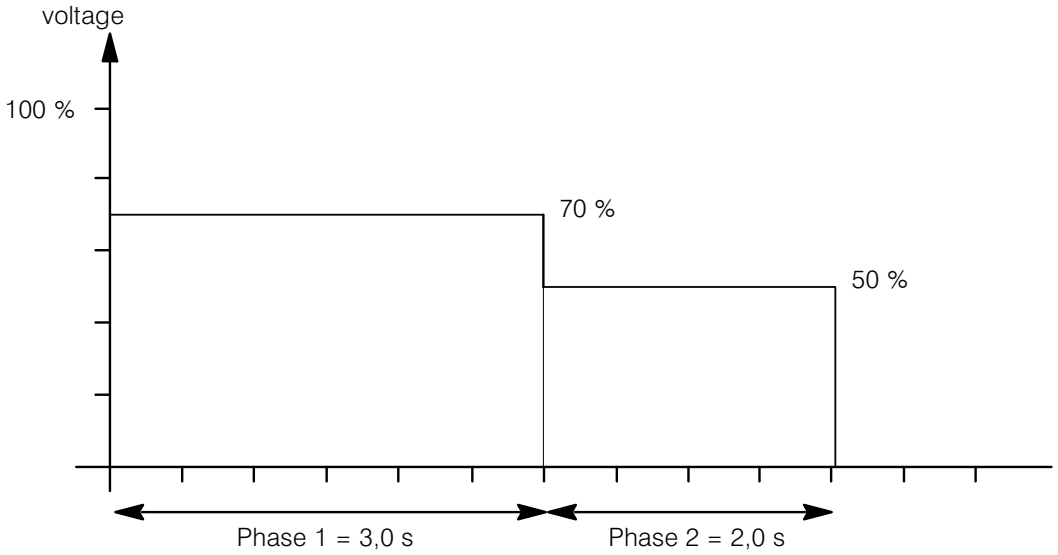
In the stop sequence menu a phase can be interrupted by pressing the stop key .

Phase 2 has no effect if *t = 0* in Phase 1.

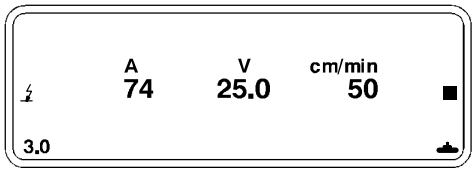
t = the durability of the sequence, indicated in intervals of 0.1 s (max. 9.9 s).

Example:

Phase 1,	time	0,1s	30
Phase 1,	speed	%	80
Phase 1,	voltage	%	70
Phase 1,	current	%	80
Phase 1,	Wire feed	%	90
Phase 2,	voltage	%	50
Phase 2,	current	%	40
Phase 2,	Wire feed	%	50



Current, voltage and speed are adjusted by indicating a percentage value of the welding parameters on the main menu.



Max. adjustable value is 150% as long as the capacity of the welding power source and the max. possible welding speed are not exceeded.

When the welding parameters are changed through the over-ride function, the values in the start sequence are changed correspondingly (see page 59).

10. DISPLAY MENU

This menu controls how the information on the display is presented: language, units and other information can be varied as required.

- Select the **DISPLAY MENU** row and press .

In Column A, the display now shows functions that can be altered, with the current choices in Column B (see below).

Example:

How to select English from the **DISPLAY MENU:**

- Select Language from Column A and press
- Find English by pressing or by pressing + .
- Return to Column A by pressing +
- Return to the **MAIN MENU** with +

English has now been selected as the display language.

Available settings for DISPLAY MENU:

DISPLAY MENU	
A	**B**
Language	Svenska / Dansk / Norsk / Suomi / English / Deutsch / Francaise / Nederlands / Espanol / Italiano / Portugues
Unit	Metric / Inches
Current display	Set value / Real value
Heat input	On / Off
Font	Small / Large
Parameter set	X

The available settings for **DISPLAY MENU** are explained on page 47.

Language

Svenska=Swedish / Dansk=Danish / Norsk=Norwegian / Soumi=Finnish /
English=English / Deutsch=German / Francaise=French / Nederlands=Dutch /
Espanol=Spanish / Italiano=Italian / Portugues=Portuguese

Units

Metric, Inches

Speeds, lengths or wire sizes in the **MAIN MENU** can be displayed in either metric units or inches.

Current

Set value, Real value

The welding parameters can be displayed as either set values or real values. The set values are stable and are not subject to rapid fluctuations. On the other hand, if information on the actual welding current is required, select **real** value and the current will be shown in figures on the **MAIN MENU** display.

Heat input

On, Off

This shows how much energy is supplied to the weld, calculated from the set values of voltage and current. It is displayed on the **MAIN MENU** as kJ/cm.

Font

Small, Large

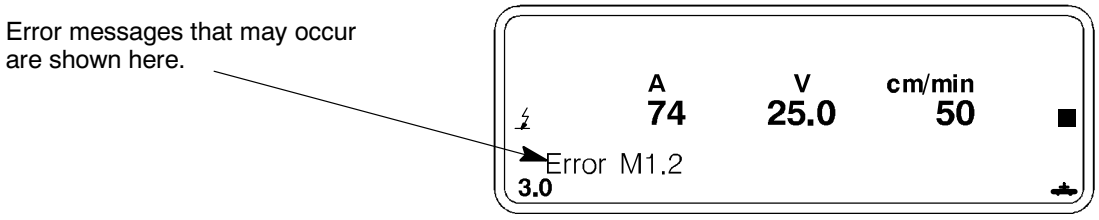
Selects small or large display figures for the welding parameters.

Parameter set

This specifies the number of parameter sets to be used: a maximum of ten is allowed. Enter a numerical for the number of sets in Column B. The default value is 1.

11. ERROR LIST

Error messages are displayed on the bottom row of the **MAIN MENU**.



When an error message is displayed, it overwrites the information that it normally displayed on the bottom row (welding preset values).

See page 49 for a list of error codes.

Error categories

Emergency stop (see page 34)

A special emergency stop function that is activated by pressing the emergency stop pushbutton in dangerous situations (e.g. risk of injury etc.).

When the reason for the emergency stop has been corrected, the emergency stop function can be reset by deactivating the emergency stop pushbutton.

Alarm

Conditions that could result in unacceptable defects in the process and which automatically generate an emergency stop. When such a fault occurs, the error message must be acknowledged by pressing after the fault has been corrected.

Error messages shown on the bottom line of the display.

Incorrect entry of numerical values

If incorrect numerical values are entered (e.g. for voltage, current or speed), a message is generated indicating the values that are allowed.

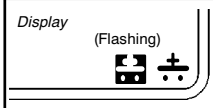
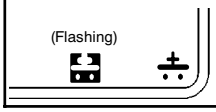
Error messages are displayed in sequence by the system and can be inspected in the **ERROR LIST** menu. The system can store up to 20 messages, after which the oldest messages are erased as new messages are added at the top of the list.

- Select the **ERROR LIST** line and press .
- Step through the list with .

  To erase the errors press
- Return to the **PRESET SYSTEM MENU** with .

Error codes

The following codes generated by the DC DUO board can be shown on the display:

M1.3	Overheating	Stop	Wait until temperature has fallen
Wire feed motor (Motor 1)			
M1.1	Tacho fault	Stop	Check travel motor / gearbox / Tacho
M1.2	Current too high	Stop	Check wire feed
Travel motor (Motor 2)			
M2.1	Tacho fault	Stop	Check travel motor / gearbox / Tacho
M2.2	Current too high	Stop	Check travel motor / gearbox
Welding power source (T1)			
T1.01	Communication error	Stop	Check cables and connections
T1.51	Incorrect welding voltage	Stop	Check joint preparation
T1.52	Incorrect current	Stop	Check joint preparation
T1.53	Unsuccessful start	Stop	Check stick-out and welding parameters
T1.54	Current limit	Stop	Welding short-circuited / Cure short-circuit
T1.55	Thermostat / overheating	Stop	Wait until temperature has fallen
T1.57	Arc extinguished	Stop	Check wire feed
Inputs / outputs			
	No cooling water (inlet K22 open) *	Stop	Check if the water is flowing or if the limit switch is open.
	No gas flow (inlet K23 open) *	Stop	Check gas pressure

* These inputs are activated by entries in the **Product code** menu / **FREE** / Binary inputs (see page 36).

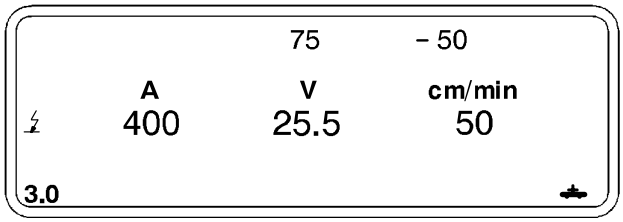
12. Test

When this menu is active, the main menu displays information that is normally hidden.

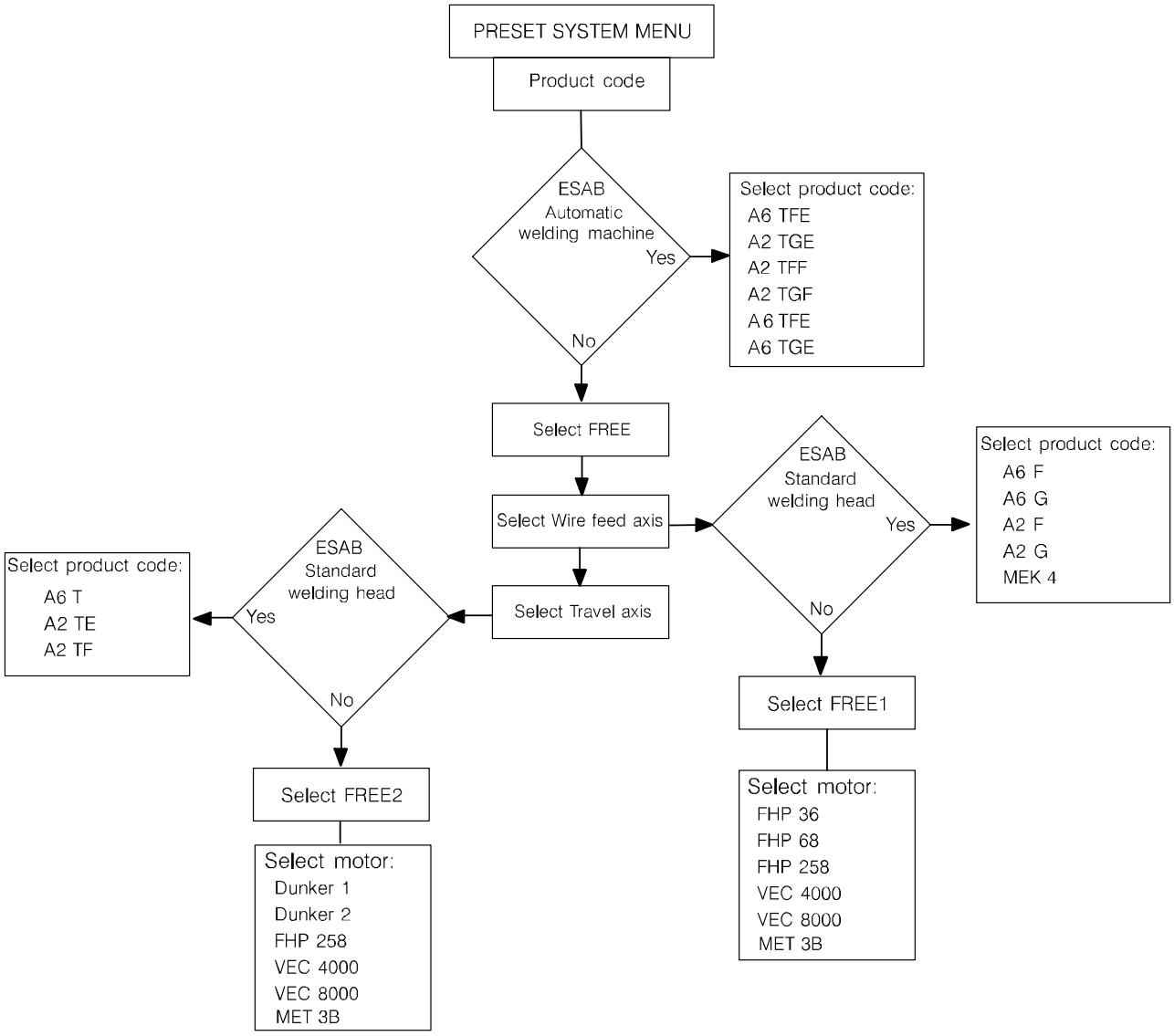
Activate the menu by entering the numerical value 1 in Column B (see the table on page 35).

Loss of voltage deactivates the **Test** menu.

Speed commands (in cm/min) are shown when the **Test** menu is active.
Wire feed speed commands are shown in the centre of the top line of the display.
Welding travel speed commands (in cm/min) are shown at the right-hand side of the top line of the display.

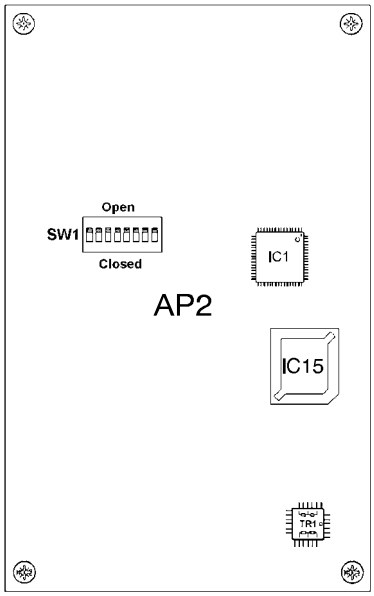


PRESET SYSTEM MENU OVERVIEW



CHANGE OF PROGRAM

GENERAL



When changing programs, the flash memory (IC15) must be replaced.
In doing this, the trimming data set will be replaced by the preset values of the new flash memory,
see page 27 (PEH1.00A, PEH1.1, PEH1.2) or
page 41 (PEH2.0).
To keep the set trimming data, the data must first be stored in the welding power source and then be sent back to the PEH electronics when the new flash memory is installed.

Store trimming data for future upgradings of the program if the complete PEH electronics are to be replaced.

STORING TRIMMING DATA

Trimming data to the welding power source:

- Press ⇧ + 4.

  Trimming data are sent from the PEH electronics to the welding power source where they are stored.

Trimming data back to the PEH electronics:

- Press ⇧ + 5.

  Trimming data are sent from the welding power source to the PEH electronics. Existing trimming data will be overwritten.
  NOTE! After the trimming data have been recalled, the voltage supply to the PEH electronics must be switched off, in order to activate the new trimming data.

NOTE! To be sure that the trimming data of the PEH electronics are stored in the welding power source, the data should always be stored before changing the program.

CHANGING THE PROGRAM IN THE PEH ELECTRONICS:

- Store trimming data in the welding power source (see *Trimming data to the welding power source* above).
- Replace the flash memory (IC15) on the NME card (AP2).
- Recall trimming data from the welding power source (see *Trimming data back to the PEH electronics* above).

CHANGING PROGRAMS IN THE PEH ELECTRONICS AND THE WELDING POWER SOURCE:

- Store trimming data in the welding power source (see *Trimming data to the welding power source* above).
- Replace the flash memory (IC15) on the NME card (AP2).
- Recall trimming data from the welding power source (see *Trimming data back to the PEH electronics* above).

  The right trimming data for the PEH electronics are now available in the new electronics program.
- Replace the flash memory (IC6) in the welding power source.
- Switch on the welding power source.

  In the event error code T1.01 should come up, the power source must be switched off and then on again for correct initiation.

CHANGING THE COMPLETE PEH ELECTRONICS KEEPING THE SETTINGS OF THE SYSTEM:

- Store the trimming data in the welding power source (see *Trimming data to the welding power source*).
- Replace the complete PEH electronics.
- Remove the flash memory (IC15) from the NME card.
- Move the flash memory (IC15) from the old NME card to the new one.
- Recall trimming data from the welding power source (see *Trimming data back to the PEH electronics*).

INTRODUCTION

A2-A6 PROCESS CONTROLLER

ESAB's A2-A6 Process Controller (PEH) is a control unit which, when combined with A2-A6 automatic welding equipment can be used for submerged-arc or MIG/MAG welding. The process controller is designed for use with ESAB's LAF and TAF welding power sources. Close integration of the control system with the welding power source makes it possible to ensure very precise process reliability.

All the controls that are needed to control welding travel and the entire welding process are situated on the control panel.

Incoming cables from various system components are connected to sockets at the rear of the process controller or to the circuit board terminals inside the controller.

WELDING POWER SOURCES

The welding power sources are specially adapted to work with the A2-A6 Process Controller. The welding power source and process controller are connected by a twin wire bus that allows the welding process to be controlled and monitored much more precisely than previously possible. The power source settings can be adjusted from the control panel on the process controller.

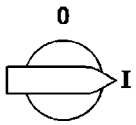
ESAB's earlier generation of welding power sources, such as the LAH, LAE and TAE can be adapted for use with the new process controller with the aid of a conversion kit. The new welding power sources are already prepared for straightforward connection to the A2-A6 Process Controller (PEH). The welding power sources also supply the correct current to the process controller, thus eliminating the need for any external power supply.

TECHNICAL DATA

A2-A6 Process Controller (PEH)	
Nominal voltage from power source	42V AC 50/60 Hz
Nominal load	Max. 900 VA
Motor connections adapted for ESAB's A2- or A6- motors	Motor current 5 A continuous, max. 10 A
Wire speed regulation	Internal EMK control or with AC tacho, 6 pulses per rev
Welding speed	0.1-2 m/min (depending on travel unit)
Max. manual travel speed	2.0 m/min
Filler wire, wire feed speed	0.3-25 m/min (depending on wire feed unit)
Standards	EN 50-199, EN 60974-1
Max. ambient temperature	45° C
Min. ambient temperature	-15° C
Relative humidity	Max. 98 %
Weight	5.5 kg
Dimensions L x B x H	355 x 210 x 164 mm
Enclosure class	IP 23

OPERATIONAL DESCRIPTION

GENERAL

Switch on welding power source 

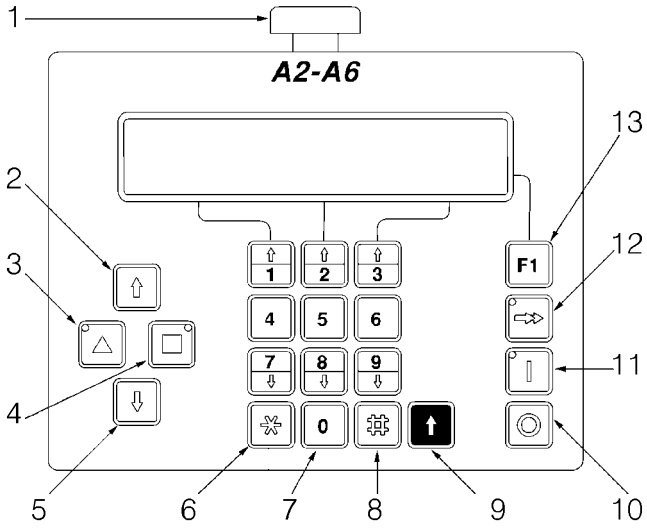
The process controller can be used **in manual** or **automatic mode**.

In **manual mode** the wire feed speed and travel speed are controlled manually and you can preset all other essential welding parameters for the current weld.

In **automatic mode** you can choose a preset group of welding parameters and fine-tune the actual welding parameters. Other settings made previously in manual mode cannot be adjusted in automatic mode.

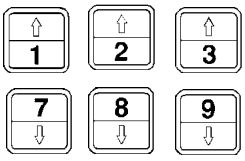
The process controller is ready for manual operation as soon as the mains power is switched on. When welding begins the controller switches to automatic mode. When welding stops, or if there is a fault, the controller switches back to manual mode.

CONTROL PANEL



1 Emergency stop
2 Retract wire
3 Travel
4 Travel, opposite direction
5 Advance wire
6 Change menu
7 Numerical key, number entry
8 ENTER key, Change row
9 SHIFT key
10 Stop welding.
Return to manual mode
11 Start welding. Switch to automatic mode
12 Fast, wire feed or travel
13 Scroll page (welding setup menu) or close valve (main menu)

The arrowed keys are used during welding to increase or decrease the current, voltage and speed.

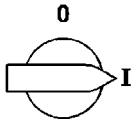


By pressing either , , + or + it is possible to browse.

MANUAL OPERATION

TRAVEL AND WIRE SPEED

Travel and wire feed commands can be given when not welding, as follows:

Switch on welding power source 

- The direction of travel is as shown by the square symbol on the power source.
  Normal speed □.
- The direction of travel is as shown by the triangular symbol on the power source.
  Normal speed △.

To stop travel described above, press the same key again.

- Retract wire. Normal speed ⇧.
  Wire continues to retract until you release the key.
- Advance wire. Normal speed ⇩.
  Wire continues to advance until you release the key.
- After switching on, you can select maximum speed by pressing the fast key ⇨.
  The LED in the key lights up.
- To return to normal speed press the fast key again ⇨.

To stop immediately, press □, △ or ◎ even at max. speed.

Normal speed and max. speed can be adjusted under the **PRESET SYSTEM MENU.**

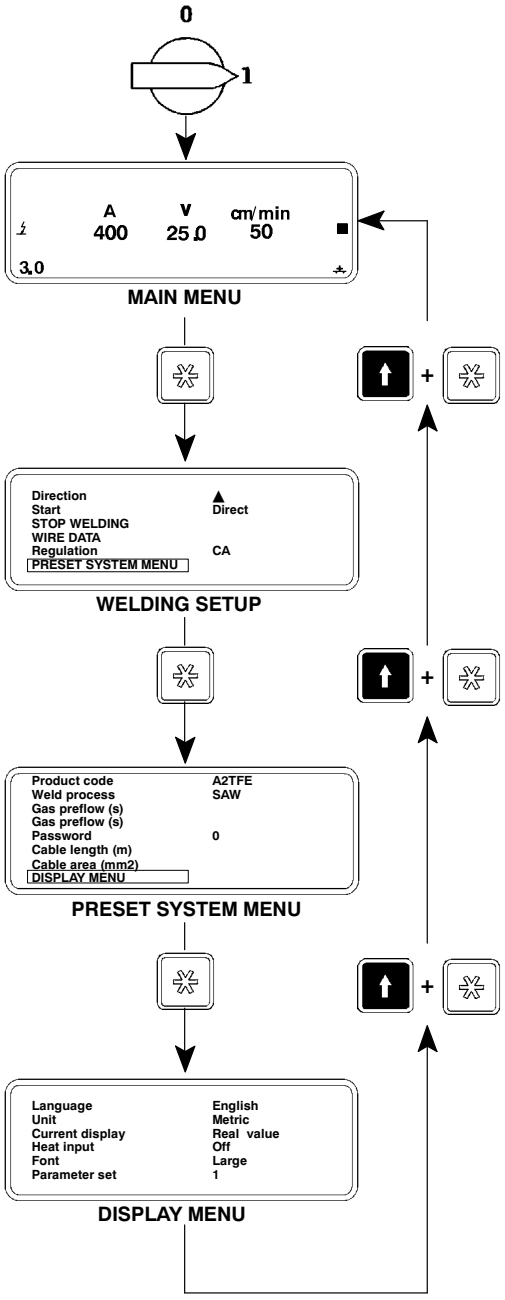
CONTROLLING VALVES

To operate a valve you must be in the **MAIN MENU.**

- Open the valve for flux or gas by pressing F1.
- Close an open valve by pressing the same key F1.

MENUS

MENU OVERVIEW



The A2-A6 Process Controller (PEH) software is divided into several menus. The program structure is described in the overview below.

MAIN MENU (see on page 57)

- SET • Heat input per cm • Welding current
- Wire feed speed • Arc voltage • Travel speed
- Preset indicators

WELDING SETUP (see on page 60)

- Welding direction • Arc start method
- Type of weld finish
- Wire data (Wire type, Wire material, Wire size)
- Regulation method

PRESET SYSTEM MENU (see on page 20 or on page 34)

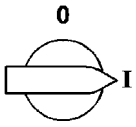
- Product code • Weld process • Gas preflow
- Gas postflow • Password • Cable length
- Cable area • Display menu • Error list • Test

DISPLAY MENU (see on page 30 or on page 46)

- Language • Unit • Current display • Heat input
- Parameter set • Font • Parameter set

MAIN MENU

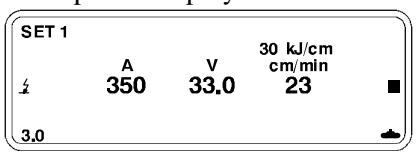
In the main menu you choose the welding current, arc voltage and travel speed you want to use for welding. During welding you can adjust the welding parameters or choose a complete new set of parameters.

Switch on the power source 

.

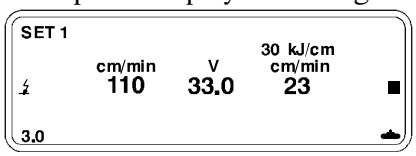
The main menu will appear as follows:

Example of display if constant current (CA) has been chosen.



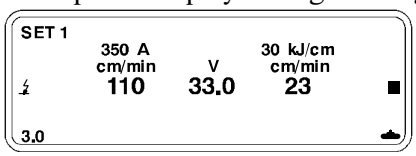
A
350 Chosen welding current in amperes.

Example of display if welding with constant wire feed speed (CW) is chosen.



cm/min
110 Indicates chosen wire feed speed.

Example of display during welding at constant wire feed speed (CW).

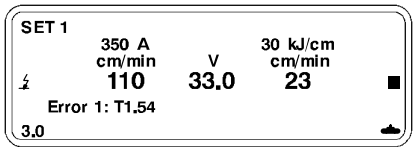


350 A Resulting welding current after the welding start.

For the selection of (CA) or (CW), see the menu **WELDING SETUP** on page 60.

SET 1	Indicates that parameter set 1 of 10 available has been selected (can be hidden).
30 kJ/cm	Indicates the heat input in kJ/cm that will result from the chosen values of welding current, arc voltage and travel speed (can be hidden).
V **33.0**	Chosen arc voltage in volts.
cm/min **23**	Chosen travel speed in centimetres per minute.
	Indicates the type of start
■	Indicates the travel direction
	Indicates if the valve output is open or closed.

Example of display in the event of a fault.



Error code appears in bottom left section of display.

Error message is cancelled by pressing

Max. 20 messages saved in chronological order.

- Start welding by pressing . The LED in the key lights up.
- Stop welding by pressing

ENTERING WELDING PARAMETERS

When the power source is switched on, the main menu appears on the display.

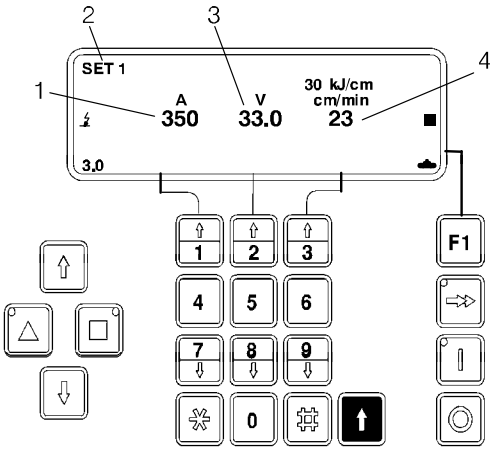
In the “Display menu” you can choose how many sets of parameters you want to work with. If more than one set of parameters is used then the SET number appears in the top left corner.

1 Welding current or wire feed speed

2 SET no.

3 Arc voltage

4 Travel speed



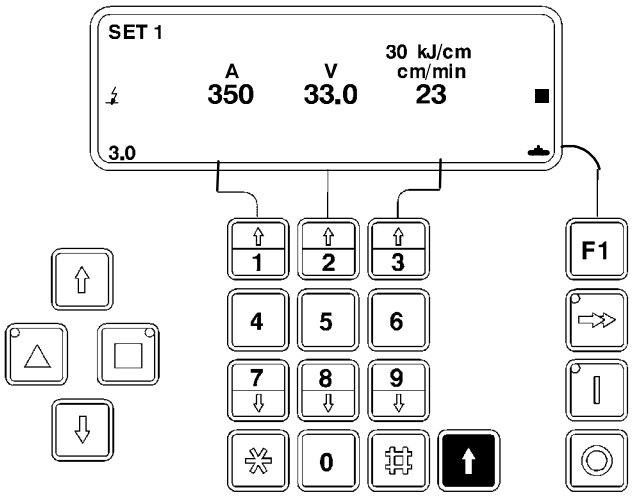
If you choose to work with just one set of parameters then start at step 3.

- Press ⇧ + ✱ to mark the “parameter set field “.
- Type in the desired SET number and press #.
- Select the field for welding current or wire feed speed by pressing #.
- Type in the desired welding current or wire feed speed. Max. 4 numbers, press #.
- Select the field for arc voltage by pressing #.
- Type in the desired arc voltage, max. 3 numbers, press #.
- Select the field for travel speed by pressing #.
- Type in the desired travel speed, max. 3 numbers and press #.

Now the whole set has been marked and is ready to use. A further 9 additional sets can be stored. (Total 10 SETs).

ADJUSTING PARAMETER VALUES (DURING WELDING)

Once welding has started the welding parameters can be fine-tuned using the arrowed numerical keys (over-ride function).



	Increase	Decrease
Welding current or wire feed speed	⇧ 1	7 ⇩
Arc voltage	⇧ 2	8 ⇩
Travel speed	⇧ 3	9 ⇩

Save the values as follows:

- Stop welding with .
- Save the changed values with .
- To revert to the original values, press + .

CHOOSING A NEW SET OF PARAMETERS DURING WELDING

(Only possible when you have chosen to work with several sets of parameters by programming the “Display” menu)

Immediate selection

Suppose that while welding with parameter set 1 (“SET 1”) you decide to change to parameter set 6 (“SET 6”) without checking the parameters first.

- Press + .

  The field “SET 1” is marked and parameter set 1 is active
- Press 6.

  The field “SET 6” flashes.
- Press .

The field “SET 6” is marked and parameter set 6 is active

Check before choosing

Suppose that while welding with parameter set 1 (“SET 1”) you decide to change to parameter set 6 (“SET 6”) after first checking the parameters.

- Mark the field “SET 1 “ by pressing ⇧ + ✲.
- Press 6.
  The field “SET 6” flashes.
- The new parameter set can be checked before being chosen by pressing ⇧ + ⌗.

The complete row displaying the welding parameters flashes and displays the values for parameter set 6 (“SET 6”), although parameter set 1 (“SET1”) remains in use during the current welding cycle.

- Press ⌗.
  The field “SET 6” is marked and parameter set 6 is active.

WELDING SETUP

GENERAL

In **WELDING SETUP** you can choose a variety of settings including start method, welding direction, wire diameter and similar variables in order to carry out a specific welding task. These settings cannot be changed during welding.

You can cancel any error message in the main menu by pressing ⌗.

- Switch from the **MAIN MENU** to **WELDING SETUP** by pressing ✲.

The display will now show a number of variables in column A (see page 61) and the relevant options in columns B and C. You can change row in column A.

- To change a setting, move from column A to columns B and C by pressing ✲.
- Scroll forward to the chosen option by pressing ⌗ or ⇧ + ⌗ or type in your own values for rows 3 and 4 (Number of wires).
- Return to column A to change row by pressing ⇧ + ✲.
- Jump to the next row by pressing ⌗.
  After the last row you will return to row 1.
- Return to the previous row by pressing ⇧ + ⌗.
  This combination will also take you straight to row 6 from row 1

Explanations of terms:

When ⇧ is indicated in combination with another key you should press ⇧ first and hold it down while pressing the second key.

AVAILABLE SETTINGS

WELDING SETUP			
	A	**B**	**C**
1	Direction	▲ (TRIANGLE), ■ (SQUARE)	
2	Start	Direct Scratch	
3	STOP WELDING	Craterfill (ms)	10-3000
		Burnback time (ms)	10-3000
4	WIRE DATA	Wire type	Solid wire, Flux cored, Strip
		Wire diameter if "Solid wire" is chosen	0.8 1.0 1.2 1.6 2.0 2.4 3.0 3.2 4.0 5.0 6.0
		if "Flux cored" is chosen	0.8 1.0 1.2 1.6 2.0 2.4 3.0 3.2 4.0
		if "Strip" is chosen	30 x 0.5 60 x 0.5 100 x 0.5
		Wire material	Fe, Al, SS
		Number of wires	1, 2
5	Regulation	CA, CW	
6	PRESET SYSTEM MENU		

Functions 1-5 are explained on pages 62 - 64.

Switches to sub-menus in rows 3, 4 and 6:

- Mark menu and press .
- Return to the **WELDING SETUP** by pressing + .
- Return to the **MAIN MENU** by pressing + .

DEFINITIONS

1. Direction

Two alternatives can be chosen ▲ (triangle) and ■ (square) (these symbols are repeated on all units)

- ▲ (triangle) indicates travel in one direction.
- ■ (square) indicates travel in opposite direction.

2. Start

Two alternatives can be chosen: **Direct start** or **Scratch start**.

- Direct start means that travel starts when the arc ignites.
- Scratch start means that travel starts at the same time as wire feed. Scrape start is used when welding rusty or dirty material.

3. STOP WELDING

Crater fill and **Burnback time** can be set.

Crater fill times between 10 and 3000 ms (0.01 - 3 sec.) can be selected.
The crater fill function is used to finish the weld without leaving a crater. Crater fill starts when the welding stop key is pressed, and continues for the preset crater fill time. This function is most useful when MIG/MAG welding.

Burnback times between 10 and 3000 ms (0.01 - 3 sec.) can be selected.
The burnback time starts after the crater fill sequence has ended. Correct choice of the burnback time prevents:
- the wire sticking to the work piece
- the wire sticking to the nozzle

4. WIRE DATA

Wire type

The equipment can be preset for the wire you intend to weld with. The control system must be given information about the wire shape in order to achieve optimum start/stop characteristics.

- **solid wire**
- flux cored
- strip

Wire diameter

The chosen wire diameter has a big effect on the start cycle and crater filling. When welding with a wire diameter that is not given in the options table, choose the nearest diameter from the menu.

Remark.
For certain wire materials a better welding result can be achieved, if a value deviating from the real wire dimension by 1 step is set (normally 1 step from the real value).

When metric units are used the following alternatives are available:

- **solid wire** 0.8 / 1.0 / 1.2 / 1.6 / 2.0 / 2,4 / 3.0 / 3.2 / 4.0 / 5.0 / 6.0 mm
- cored wire 0.8 /1.0 / 1.2 / 1.6 / 2.0 / 2,4 / 3.0 / 3.2 / 4.0 mm
- strip 30 x 0.5 / 60 x 0.5 / 100 x 0.5 mm

When inch units are used the following alternatives are available

- **solid wire** 0.030, 0.040, 0.047, 1/16, 5/64, 3/32, 7/64, 1/8, 3/32, 7/64, 1/8, 5/32, 3/16, 1/4
- cored wire 0.030, 0.040, 0.047, 1/16, 5/64, 3/32, 7/64, 1/8, 3/32, 7/64, 1/8, 5/32
- strip 30 x 0,5 / 60 x 0,5 / 100 x 0,5

Wire material

When welding with different filler materials the start and stop method is affected by the choice of materials. It is therefore important that the settings show whether you are welding with steel-based or aluminium-based filler wires.

- **Fe** Steel filler wire
- Al Aluminium filler wire
- SS Stainless Steel filler wire

Number of wires

Values between 1 - 2 can be entered.
For example, if welding with two wires (Twin Arc) enter the value 2.

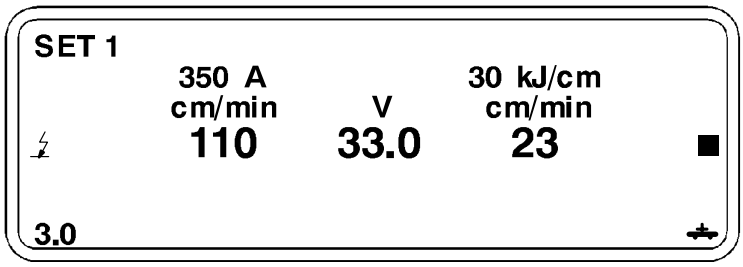
5. Regulation

Two different operating modes can be used for welding, either constant current, **CA**, or constant wire feed speed, **CW.**

- **CA**, constant current. Normally used for submerged arc welding, which involves working with large welds, large currents and large weld pools. The wire feed speed is controlled by the power source to maintain a constant current.
- **CW**, constant wire feed speed. Normally used for MIG/MAG welding, for small weld pools, thin sheet metal and thin filler wire. It is easier to achieve a constant throat thickness when welding with this method. Welding is controlled by selecting a fixed wire feed speed and the current is adjusted to achieve this speed. The resulting current is displayed above the selected wire feed speed (see display shot on page 64).

PRESET INDICATORS

The numbers and symbols on the display show the chosen preset values, see table below.



Shown in display **"MAIN MENU"** as		**"WELDING SETUP"** options
	Start	Direct Scratch
▲ ■	Direction	TRIANGLE SQUARE
Shown in plain English (e.g. 3.0)	Wire diameter: Solid wire Flux cored Strip	 0.8 1.0 1.2 1.6 2.0 2.5 3.0 3.2 4.0 5.0 6.0 0.8 1.0 1.2 1.6 2.0 2,4 3.0 3.2 4.0 30 x 0.5 60 x 0.5 100 x 0.5
	OUTPUT ON/OFF	Valve

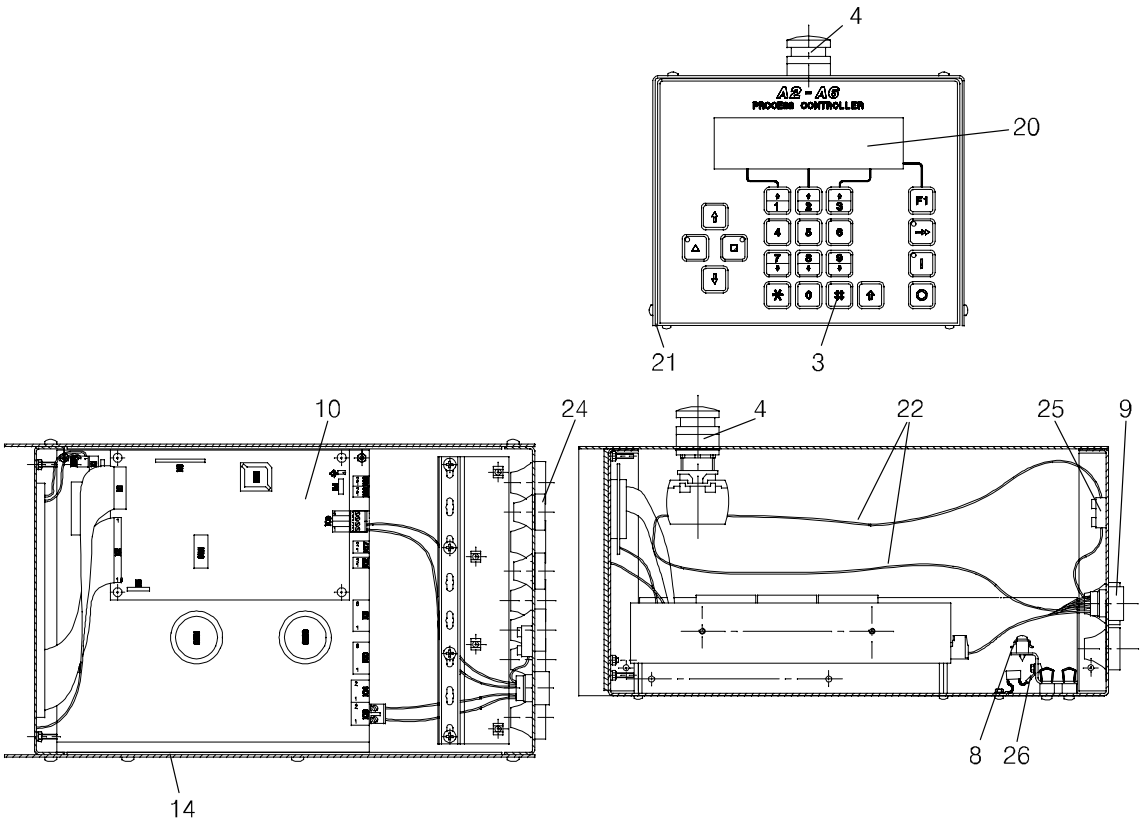
A2-A6 Process controller
PEH

Edition 9809

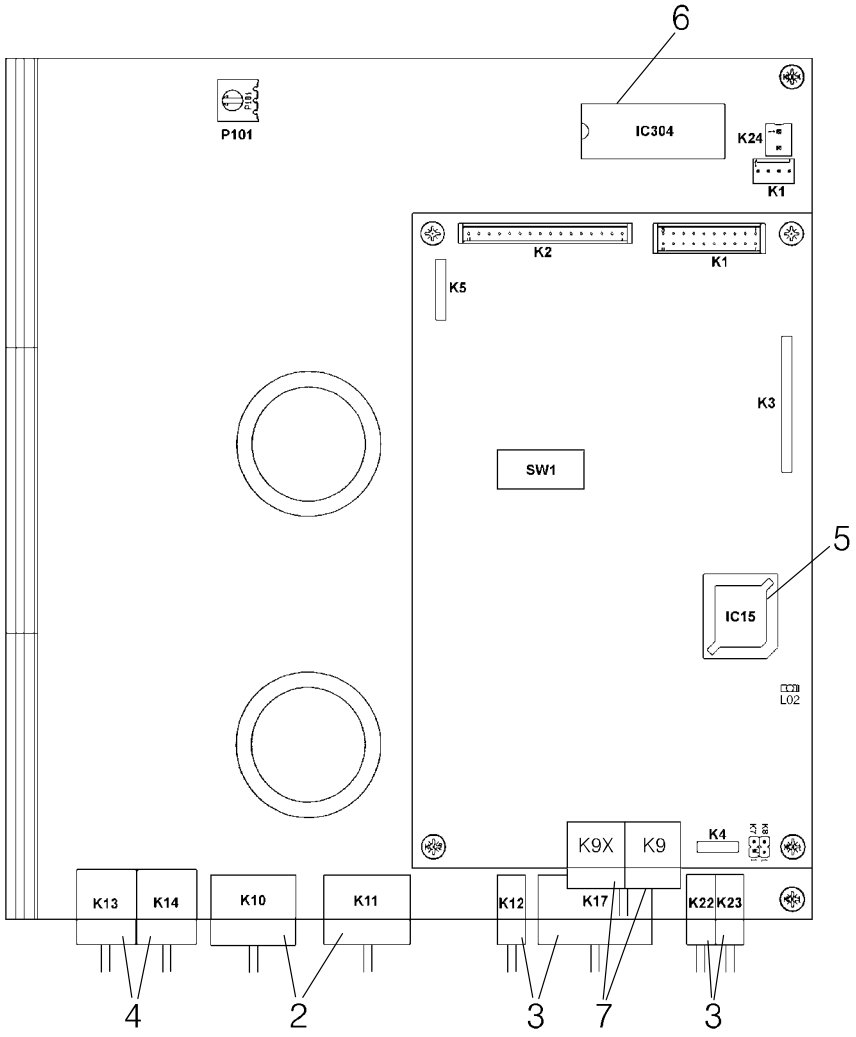
Spare parts are to be ordered through the nearest ESAB agency as per the list on the back of the cover. Kindly indicate type of unit, serial number, denominations and ordering numbers according to the spare parts list.

C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
		0443 741 880	**Control box**		
3	1	0443 638 880	Control panel		KB1
4	1	0443 740 001	Emergency stop		ST1
8	1	0457 278 001	Rail		
9	1	0443 748 880	Cable, complete		XS1
10		0443 730 880	Circuit board		AP1 + AP2
14	1	0443 849 001	Insulation		
20	1	0443 726 001	Display		DY1
21		0192 526 003	Sealing strip	530 mm	
22		0262 612 714	Cable	330 mm	
24		0443 729 002	Inlet		
25		0193 045 001	Connection block	2-pole	X2
26	1	0467 911 883	Capacitor	Valid from program version PEH1.2	



Item no.	Qty	Ordering no.	Denomination	Notes	C
		0443 730 880	**Circuit board**		**AP1 + AP2**
2		0456 489 002	Connection terminal	6 poles	K10, K11
3		0456 489 001	Connection terminal	2 poles	K12, K17, K22, K23
4		0456 489 004	Connection terminal	2 poles	K13, K14
5	1	0486 471 880	Flash memory		IC15
6	1	0486 473 880	EPROM Capsule		IC304
7		0456 489 005	Connection terminal	4 poles	K9, K9X



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